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**From:** Williams, Walter W. (CDC/OD/OSI)  
**Sent:** Wednesday, May 31, 2006 4:51 PM  
**To:** Bryan, Ralph T. (CDC/OD/OSI); Snesrud, Pelagie (Mike) (CDC/OD/OSI)  
**Subject:** FW: Update on EPA Tribal Research Program-- 2006 RFA Development  
**Attachments:** Cover Letter.doc; Call for Papers.doc; Subtopics.doc; Submission Form for Presentations.doc; Science Priorities Document.pdf; TTL Tribal Issues Paper.pdf

FYI

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-----Original Message-----

**From:** Seneca, Dean (ATSDR/OA/OD)  
**Sent:** Wednesday, May 24, 2006 11:53 AM  
**To:** 'Native Research Network list'; 'Network in Support of Native Students in Six Nations Territories'  
**Cc:** 'Hemmett.Roland@epamail.epa.gov'  
**Subject:** FW: Update on EPA Tribal Research Program-- 2006 RFA Development

FYI

Dean S.

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-----Original Message-----

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**Sent:** Wednesday, May 24, 2006 8:11 AM  
**To:** Seneca, Dean (ATSDR/OA/OD)  
**Cc:** [Rodia.Monica@epamail.epa.gov](mailto:Rodia.Monica@epamail.epa.gov)  
**Subject:** RE: Update on EPA Tribal Research Program-- 2006 RFA Development

Dean, I would like to introduce myself to you. As you can see below I am the science advisor in EPA Region 2. More importantly I am the co-chair of the EPA's Tribal Science Council. My co-chair is Dave Nelson from the Cheyenne River Sioux Tribe. The TSC is having a science conference ( National Forum on Tribal Environmental Science) during the week of September 24th at the Quinault Nation in Oceans Shores, Washington. I have attached the call for papers and related documents for you. We are looking for a broad distribution of the call for papers and any way you could help would be appreciated. If you are interested in participating in the conference please contact me as we are interested in attracting other federal agencies.

(See attached file: Cover Letter.doc)(See attached file: Call for Papers.doc) (See attached file: Subtopics.doc) (See attached file: Submission Form for Presentations.doc)

I have also attached two documents that the TSC has recently produced (Tribal Science Priorities and Tribal Risk Assessment Issues).

(See attached file: Science Priorities Document.pdf)(See attached file: TTL Tribal Issues Paper.pdf)

The TSC is interested in reaching out to other federal agencies to see what issues they are working on and if we can combine forces. We would certainly be interested in talking with you. If you are interested please contact me at 732-321-6754.

Rollie

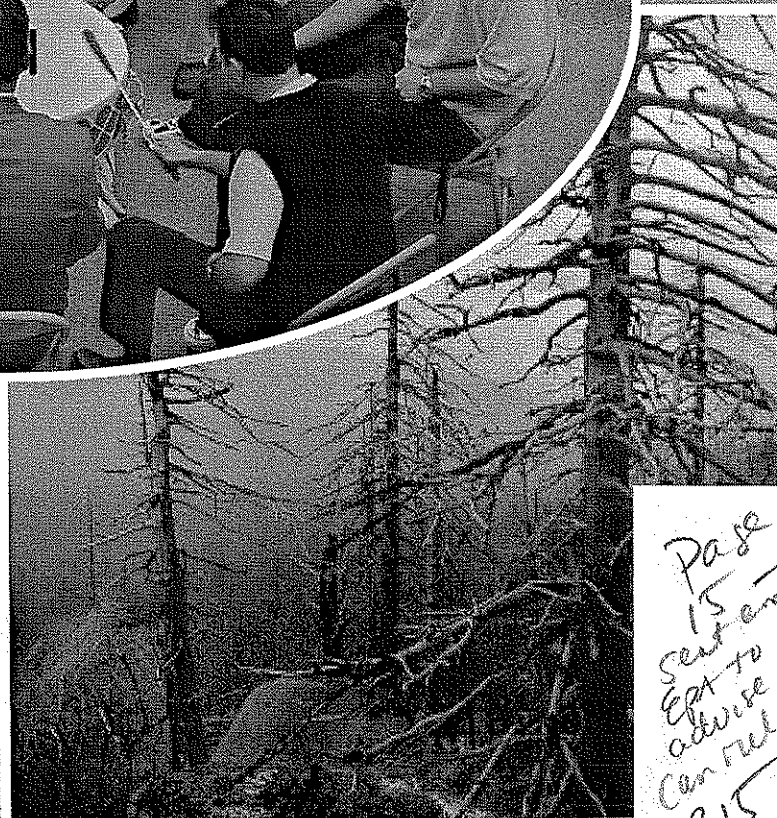
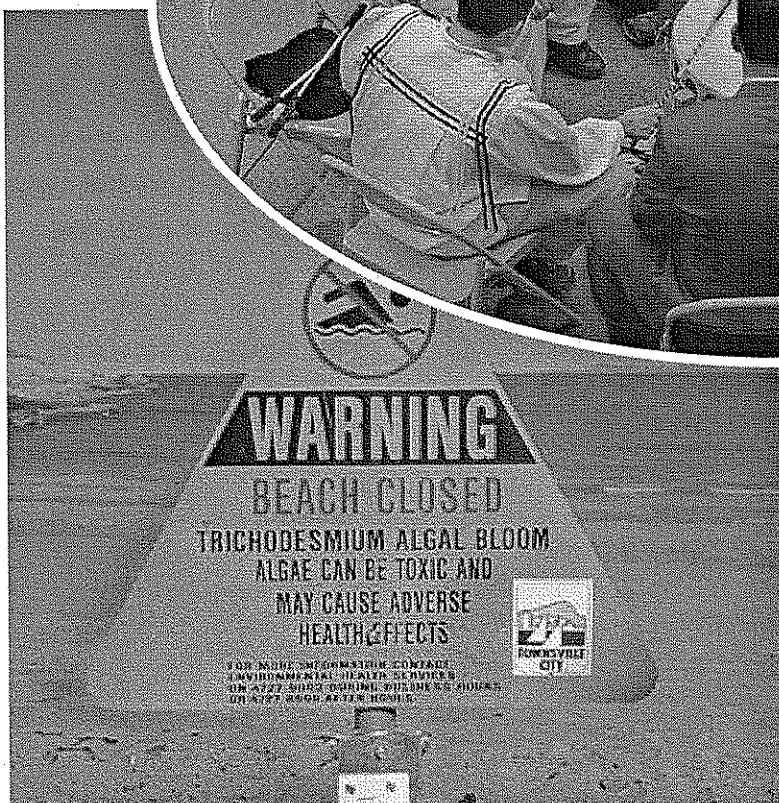
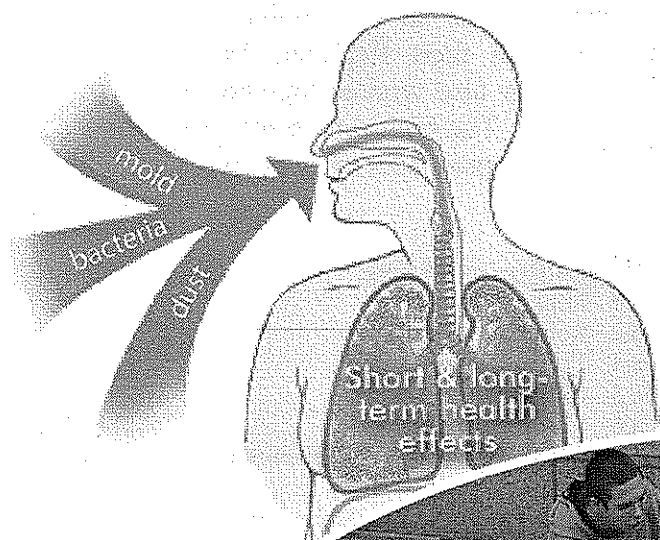
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United States  
Environmental Protection  
Agency

# National Tribal Science Priorities

April 2006



Page 15  
Sent to EPA to advise if can rule P.15

Developed by the National  
EPA-Tribal Science Council

## ACKNOWLEDGMENTS

The National EPA-Tribal Science Council (TSC) wants to acknowledge all the tribal and EPA representatives on the workgroup for their contributions in developing the document. The tribal representatives worked diligently with their Regional Tribal Operations Committee to identify priority science issues. They also worked together to develop national priority issues in common for Indian Country. The EPA representatives identified possible efforts to address the issues. The TSC representatives who were involved in developing the document are:

### Current Tribal Representatives:

Dan Kusnierz, Penobscot Nation  
 Linda Logan, Tonawanda Seneca Nation  
 Michael Bolt, Eastern Band of Cherokee Indians  
 Troy Pierce, Poarch Band of Creek Indians  
 Christine Berini, Fond du Lac Band of Lake Superior Chippewa  
 Curtis Munoz, Kiowa Tribe  
 Denise West, Winnebago Tribe of Nebraska  
 Richard Janssen, Confederated Salish and Kootenai Tribes  
 Vickie Kujawa, Flandreau Santee Sioux Tribe  
 Marshall Cheung, 29 Palms Band of Mission Indians  
 Dave Nelson, Cheyenne River Sioux Tribe

### Former Tribal Representatives:

James Ransom, Saint Regis Mohawk Tribe  
 Brenda LaFrance, Mohawk Nation of Akwesasne  
 Bernadette Hudnell, Mississippi Band of Choctaw Indians  
 Steve Terry, Miccosukee Tribe of Florida  
 John Persell, Minnesota Chippewa Tribe  
 Kendal Coats, Muscogee (Creek) Nation  
 Gina Kneib, Sac & Fox Nation of Missouri  
 Fran King-Brown, Southern Ute Indian Tribe  
 Kesner Flores Jr., Cortina Indian Rancheria  
 Clay Bravo, Hualapai Tribe  
 Cisney Havatone, Hualapai Tribe  
 Chris Gannon, Confederated Tribes of Warm Springs  
 Shawna Larson, Chickaloon Village

### Current EPA Representatives:

Region 1 Robert Hillger  
 Region 2 Roland Hemmett  
 Region 4 Thomas Baugh  
 Region 5 Gary Gulezian  
 Region 6 Michael Callahan  
 Region 7 Brenda Groskinsky, Elizabeth Wendt  
 Region 8 Patti Tyler  
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 Region 10 Dana Davoli  
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 OAR David LaRoche  
 OEI Elizabeth Jackson  
 OPEI Charlotte Bertrand  
 OPPTS Elizabeth Resek  
 ORD Thomas Barnwell  
 OSWER David Charters  
 OW Rita Schoeny

### Former EPA Representatives

Region 1 Gerry Levy, Valerie Ferry, Eva Tasaki  
 Region 2 Barbara Finazzo  
 Region 5 Robert Springer  
 Region 6 Norman Dyer  
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 Region 8 Kerry Clough, Connally Mears  
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 Region 10 Scott Sufficool, Patricia Cirone, Sandra Johnson  
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 ORD Harold Zenick

Also, the National EPA-Tribal Science Council wants to thank Claudia Walters who served as the Executive Secretary for the National EPA-Tribal Science Council since its' formation. The TSC also wants to thank Pat Tallarico and Karen Santora from SRA International, Inc. for their support in developing the document.

# Table of Contents

<b>ACKNOWLEDGMENTS.....</b>	<b>2</b>
<b>I. Background.....</b>	<b>4</b>
<b>II. Development of the National Tribal Science Priorities .....</b>	<b>5</b>
<i>Initial Tribal Science Priorities Identified—September 2002 .....</i>	<i>5</i>
<i>Tribal Science Priorities Reassessed—November 2004 .....</i>	<i>5</i>
<i>Tribal Science Priorities Refined—May 2005 .....</i>	<i>6</i>
<b>III. Considerations for each National Tribal Science Priorities.....</b>	<b>7</b>
<i>Tribal Traditional Lifeways—An Overarching Issue .....</i>	<i>7</i>
<i>Improve the Agency's Environmental Decision-Making Processes .....</i>	<i>8</i>
<i>Cross-Priority Activities .....</i>	<i>9</i>
<b>IV. Current National Tribal Science Priorities.....</b>	<b>10</b>
<i>Habitat Loss .....</i>	<i>10</i>
<i>Contaminated Precipitation.....</i>	<i>13</i>
<i>Biological Stressors (e.g., algal blooms, cyanobacteria) .....</i>	<i>15</i>
<i>Environmental Triggers for Respiratory Distress .....</i>	<i>16</i>
<i>Pharmaceuticals in Waste Water (including personal care products and antibiotics in livestock products) .....</i>	<i>18</i>
<i>Dioxin and Dioxin-like Compounds.....</i>	<i>20</i>
<i>Persistent Bioaccumulative Toxics Source Reduction .....</i>	<i>21</i>
<i>Endocrine Disruptor Chemicals. ....</i>	<i>22</i>

## **I. Background**

The National EPA-Tribal Science Council (TSC) was formed in 2001 to provide a forum for tribes and EPA to work collaboratively to identify and address national environmental science issues of importance to both tribes and EPA. Composed of tribal representatives from each EPA Region and Alaska and EPA representatives from each EPA Program and Regional Office, the Council is organized to ensure a national, cross-program perspective and approach. The tribal TSC representatives are selected by the respective Regional Tribal Operations (ROTC) to serve as a liaison between the ROTC and TSC.

The document is organized to provide a context and description of the science priorities identified by the tribal TSC representatives. Section II describe how the tribal science priorities have evolved and changed since they were first proposed in 2002. Section III describes the relationship between tribal traditional lifeways, other processes, and the science priorities. Section IV discusses the current priorities in detail.

## **II. Development of the National Tribal Science Priorities**

The primary purpose of the TSC has been to collaborate with the Regional Tribal Operations Committees/Regional Operations Committees on tribal science priorities. The TSC tribal representatives work with the tribes in their Region to gather their science priorities. The TSC tribal representatives work together to identify those that are national in scope and those priorities that are Regional in nature are addressed through the TSC Regional representatives. In identifying these priorities, tribes seek to: (1) understand what ongoing activities are occurring at EPA to address these issues and where this information resides within EPA, (2) assess how tribes could contribute to advancing the science surrounding these issues, and (3) identify what tribes could do to help get these issues included into the Agency's budget priorities. This process for identifying and discussing tribal science priorities helps ensure that the TSC's activities are always tribally driven, a core part of the TSC's mission. The priorities that are national in scope are discussed with the TSC Agency representatives to determine appropriate actions.

### ***Initial Tribal Science Priorities Identified—September 2002***

The first set of national tribal science priorities was identified by the TSC tribal representatives in September 2002. The priorities were compiled by the representatives from input they had received from tribes in their respective Regions. Upon examining the various lists of Regional tribal science priorities, the tribal representatives selected only priorities that were national in scope and then organized and categorized these priorities for presentation to their Agency counterparts. The initial tribal science priorities identified included:

- Tribal Traditional Lifeways (including tribally relevant risk assessment and a new concept for environmental decision making),
- Endocrine Disruptor Chemicals (EDCs),
- Dioxin Reassessment and Reference Dose,
- Cumulative Impacts,
- Toxic Mold,
- Pharmaceuticals in Wastewater, and
- Tribal Research (including global warming and climate change monitoring).

### ***Tribal Science Priorities Reassessed—November 2004***

Between 2002 and 2004, the TSC held workshops, encouraged research efforts, and developed tools to share information on these topics. As a result of these activities and input from tribal representatives about new or changing science priorities in Indian country, the Council reassessed the original priorities at their meeting in Carlton, MN, in November 2004. Most notably, the tribal representatives decided to reframe each science priority in terms of its overarching relationship to and impact on tribal traditional lifeways. Originally, tribal traditional lifeways had been a discrete priority in relation to the TSC's efforts regarding risk assessment and development of a new environmental decision-making concept based around health and well-being. However, through the TSC's discussions, it became apparent that the aspect of each science priority that made it particularly relevant to tribes was its impact on tribal traditional lifeways.

In addition, the TSC chose to revise some of its initial science priorities and add a few new priorities. The TSC identified both "Habitat Loss" and "Biological Stressors (e.g., algal blooms and cyanobacteria)" as new priorities. The Council also changed the title of the "Dioxin Reassessment and Reference Dose" issue to "Dioxin and Dioxin-like Compounds" to reflect the broader issue of concern. Additionally, the TSC changed the "Tribal Research (Including Global Warming and Climate Change Monitoring)" issue so that tribal research was included as an activity under each of the other tribal priorities. Global warming and climate change were incorporated into a new topic, "Habitat Loss." Finally, the TSC decided to replace the "Toxic Mold" issue with the broader topic of "Environmental Triggers for Respiratory Distress." The Council determined that toxic mold was of concern largely because of the respiratory problems it contributes to, and felt that the issue should be broadened to include other triggers as well.

In addition, the TSC decided at the Carlton, MN meeting that each tribal science priority identified should be considered in relation to a series of cross-priority activities, including risk (i.e., exposure and impact), education, research, environmental justice, and restoration.

#### ***Tribal Science Priorities Refined—May 2005***

At the TSC meeting held in Denver, CO, in May 2005, the Council worked to refine and clarify the national tribal science priorities. Specifically, the tribal representatives worked to (1) fully define the science priorities as they relate to Indian country, and (2) provide specific examples of how each issue impacts Indian country. In a separate discussion, Agency representatives provided additional information on (1) the Agency's proposed actions and products to address each science priority issue and (2) the description of the Agency's activities to date for each issue. The refined listing of science priorities resulting from this discussion and a diagram of their relationships can be found in Section III.

### III. Considerations for each National Tribal Science Priority

The TSC tribal representatives identified three sets of considerations for each of the national tribal science priorities:

- Tribal traditional lifeways
- Environmental decision-making processes
- Cross-priority activities

#### *Tribal Traditional Lifeways—An Overarching Issue*

Tribal traditional lifeways<sup>1</sup> encompass the unique cultural, spiritual, economic, and language practices pursued by tribal communities. While EPA's mission is to protect human health and the environment, tribes have expressed concerns that many environmental criteria and standards are not adequately protective of tribal community health or natural resources, given the unique relationship that many tribes have with the environment and the unique role that the environment plays in the continuation of their cultural, spiritual and dietary practices.

When tribal lands are degraded, the impact to tribal traditional lifeways can be considerable. Tribal resources can decline, disappear, or become contaminated, and as a result, tribes may be unable to practice their traditional ways of life as before—with detrimental impacts to the cultural, spiritual, economic, and health of tribal communities. When tribal resources become unavailable, language, income, and/or cultural (e.g., hunting, gathering, harvesting, basket making, sweat lodge, etc.) practices surrounding these resources can be lost. When resources such as traditional foods (e.g., fish, sea mammals, beavers, moose, deer, and wild rice) are lost to tribal communities, direct health impacts may result (e.g., increased rates of cardiovascular and diabetes) as alternative foods replace traditional diet. In addition, the tribe's history and cultural practices that revolve around these aspects of the environment may come to an end.

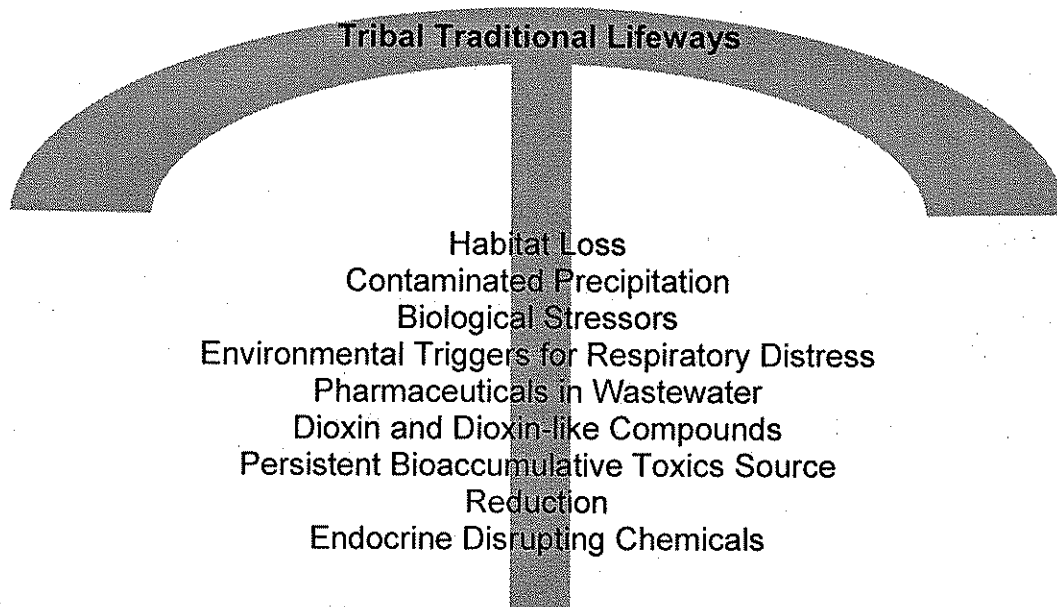
As a result, TSC tribal representatives have identified traditional tribal lifeways as the overarching issue under which all of the tribal science priorities fall. The importance of each science priority is directly related to the way in which the issue impacts not only tribal health and the environment, but also the way in which it directly impacts the ability of tribal communities to pursue their traditional tribal ways of life—with direct implications for cultural, spiritual, economic, and language practices of tribal communities.

The diagram below shows the importance of tribal traditional lifeways and the relationship to the national tribal science priorities. Tribal traditional lifeways acts as an umbrella to the science priorities. Each science priority, for instance, habitat loss would

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<sup>1</sup> The term "tribal traditional lifeways" was identified by TSC tribal representatives as the preferred way to describe the unique cultural, spiritual, economic and other practices that connect tribes to their environment, their past and their future. It was meant to replace the term "subsistence" that was commonly used to describe these things but was considered to have negative connotations.

come under the umbrella and be viewed from the tribes' traditional ways and relationship with the environment and others – their ability to continue life - their own and future generations. Therefore, tribal traditional lifeways would be considered in conjunction with each of the science priorities.



### ***Improve the Agency's Environmental Decision-Making Processes***

Tribes assert that EPA's current risk assessment policies and procedures for environmental decision-making are not protective of tribal resources and lifeways.

#### **Improve Environmental Decision-making Processes:**

- Current Risk Assessment paradigm
- Create a new environmental decision-making process

The processes fail to adequately account for or include a holistic approach for assessing the social, cultural, and spiritual values, beliefs, and practices that link tribal people to their environment. Since current risk scenarios and risk factors are geared toward urban settings in the United States, they may not consider subsistence lifestyles. Therefore, tribes who practice traditional lifeways outside the "mainstream" are less protected, since they are subject to exposure levels higher than those included in typical exposure factors. In addition, the risk management solutions identified from the current risk assessment methodologies often force tribal populations to alter activities that are core to their existence, such as those constraints imposed by the creation and adoption of fishing and hunting advisories.

The TSC has identified environmental decision-making processes as an area for improvement. The TSC recognizes that EPA currently utilizes the risk assessment paradigm as the basis for environmental decision-making and seeks to improve the policies and practices to incorporate tribal traditional lifeways. In addition, the TSC recognizes that the fundamental assumptions and approach of EPA's risk assessment paradigm can not fully address tribal issues and perspectives and seeks a longer-term goal

of developing a new environmental decision-making paradigm for EPA consideration – one focusing on human and ecological health well-being.

### ***Cross-Priority Activities***

As noted previously, the TSC identified a number of activities to be considered for each of the national tribal science priorities. Each activity identified is listed below along with a brief description of its relevance to the science priorities.

#### **Cross Priority Activities:**

- Exposure and Impact
- Education
- Research
- Environmental Justice
- Restoration

- ***Exposure and Impact*** – One of the primary factors that drove its listing was the concern that tribes had about exposure to environmental contaminants or changes and the impact of these exposures to tribal populations. Tribes are interested in better understanding and protecting against harmful impacts and outcomes to the health of tribal communities and the environment.
- ***Education*** – In many cases, the science priorities identified are of concern to tribes at least in part because tribes feel there is not enough information about the issue and how it specifically relates to tribes. Although EPA may have a number of resources available on these topics, more effort needs to be made to get this information out to Indian country so that tribes have a more complete picture of the issue and its potential impacts.
- ***Research*** – For a number of cutting-edge science priority issues, including “Pharmaceuticals in Wastewater” and “Endocrine Disrupting Chemicals,” tribes are especially interested in learning more about the Agency’s current research efforts and to learn of avenues to increase tribal participation in these research efforts. In many cases more research may be needed to better understand how these issues are impacting tribal populations.
- ***Environmental Justice*** – With respect to each science priority, tribes wish to recognize and to protect against disproportionate impacts to tribal communities by environmental hazards. Tribes assert that, given that tribal lifeways are uniquely tied to tribal lands, they are often disproportionately impacted by environmental hazards.
- ***Restoration*** – Once issues are fully understood, steps need to be taken to restore the environment and tribal traditional lifeways. These steps should be appropriate, taking into account tribes’ unique legal and cultural status.

## IV. Current National Tribal Science Priorities

This section describes each of the current national tribal science priorities and provides examples of why these priorities are of concern in Indian country as well as information on what EPA has done or is doing in response to these priorities.

### *Habitat Loss*

#### Description

Habitat loss occurs when an ecosystem experiences a change in its structural makeup (either flora and/or fauna) due to an outside influence. Habitat loss can be particularly detrimental to tribal communities pursuing traditional lifeways because many tribes depend on specific species of plants or animals or land areas to support their cultural practices. Without these specific resources, they are not able to continue these practices. Substituting other resources is often not an option or can have other detrimental environmental or health impacts.

Habitat loss can occur in a variety of ways, including reservoir and dam management and mining impacts, which are of particular concern to tribes.

Specific concerns related to reservoir and dam management include: (1) the impact to habitat by sediment loading through the controlled raising and lowering of river and reservoir levels and the impact of the potential influx of contaminants that are brought in with the sediments; (2) the impact of water fluctuation and water loss on tribal communities living along waterways [e.g., lack of drinking water, impacts to fish and waterfowl, impacts to traditional gathering practices (e.g., for medicinal plants, basket making materials, etc.), impacts to traditional activities (e.g., such as dances that are held in areas along the river)]; (3) the impact of management practices on groundwater recharge and its impact on tribal water supplies; and finally (4) the impact of the

#### **Examples Where Tribal Impacts from Reservoir and Dam Management are Felt**

- The Penobscot Nation Reservation waters currently support extremely diminished runs of salmon ( $\approx$  2% of historical runs) and eels, and populations of alewives, shad, and sturgeon are nearly absent. The low population levels are due to cumulative fish passage and habitat impacts of multiple dams and other historical upstream production that has impacted habitat for these species.
- Water diversion in the Klamath River is affecting the local salmon population on which the Klamath Tribe depends.
- Water transfer on the San Francisco Bay Delta is impacting a number of tribes in the area.
- Water diversion on the Salton Sea is impacting a number of tribes bordering the sea and impacting a major Pacific flyway for migratory birds.
- Water diversion on the Colorado Delta, which borders Mexico, is impacting various tribes.
- Channelization of the Missouri River is impacting neighboring tribes. Denise West looked into – TSC needs to decide whether to include. If it is included, additional detail is needed.
- Water quality data collected since 1999 indicates that Deadfish Lake on the Fond du Lac Reservation, a premier producer of wild rice, is seeing higher nutrients and sediment mercury concentrations than other lakes on the reservation. The data suggests that the filling and releasing of water from an impoundment built to control water levels and protect the wild rice from water level fluctuations that negative affect the rice crop are responsible. However, more research is required to confirm these findings.

lack of any formal or prescribed fish passage facilities at some dams, cumulative upstream and downstream fish passage inefficiencies and losses at dams with formal fish passage facilities, and lost or degraded production habitat and enhanced predatory environments due to associated impoundments.

**Examples Where Tribal Impacts from Mining Issues are Felt**

Interest by a mining company to develop mine lands associated with an Alaska Native Community, where there is concern that mining impacts will harm lake seals---This is one of two areas in the world where lake seals are found.

Specific concerns related to mining impacts include: (1) the impact of radium from mining activities on tribal drinking water sources, and (2) the impact of mining activities on tribal lands and resources.

Although the group recognized that this is a significant and broad issue, the tribal

representatives suggested that the TSC conduct educational and outreach efforts on this topic to enhance the scientific capacity of tribes in the areas of sampling, monitoring, and data assessment and the development of environmental standards to protect species or specific habitats (e.g., water quality standards).

Efforts to Address This Issue:

When the TSC tribal representatives identified this issue in 2004, they worked with their EPA counterparts to assess what activities were being done to address the issue and identify any additional activities that would be helpful.

Efforts already underway on this issue include:

- EPA is developing habitat criteria; there is a framework for guiding and prioritizing habitat research under discussion between Office of Water and Office of Research and Development.
- EPA's Science Advisory Board has begun investigating the potential for EPA to develop methods or processes for Valuing the Protection of Ecological Systems and Services.
- EPA Ecological Benefits Assessment Strategic Plan (EBASP). The plan is being prepared by a multidisciplinary workgroup of EPA ecologists and economists as part of the Agency's ongoing efforts to improve our ability to value the ecological benefits of EPA policies and actions.
- NatureServe is developing criteria for healthy habitats. This group collects and checks many sorts of environment data.
- The Las Vegas lab for terrestrial habitat does GIS-based spatial analysis, also referred to as landscape ecology. This group could serve as a resource to tribes.

Based on these current activities, the tribal representatives identified additional requests that, if met, could assist tribes in understanding and addressing this issue. In 2005, the TSC met to discuss these requests and respond to them. The requests identified and EPA's actions in response to these requests are included below.

- Conduct research on the extent of habitat loss in Indian country, the causes of habitat loss and methods to regain/restore the habitat. (For example, the TSC could pilot an Environmental Monitoring and Assessment Program/Regional

Environmental Monitoring and Assessment Program (EMAP/REMAP) project in Indian country, and biasing the sampling scheme to focus specifically on Tribal lands. Through this process, tribes can take advantage of funds EPA has allocated to train tribal members to do such work, and can collect desired data as they go through their training. Tribes can also work on developing culturally-relevant indicators and can compare the data from Indian country to the national database. Region 10 has done some of this work with the Nez Perce tribe.)

- EPA OW and ORD are discussing a framework for guiding and prioritizing habitat research. Tom Barnwell and Rita Schoeny will invite a representative from EPA OW and ORD to present the TSC tribal representatives with an overview of what the Agency is doing with respect habitat loss to; this could result in a pilot on tribal lands.
- TSC Member Tom Barnwell (EPA ORD) will contact Bruce Jones to advocate and educate about tribal interest in this topic and will assess EPA ORD's activities in this area.
- TSC Member Rita Schoeny (EPA OW) will provide a discussion document that addresses habitat loss research plans for distribution to the TSC.
- Contact SAB regarding the activities of the subcommittee working on Valuing the Protection of Ecological Systems and Services and contact EPA's workgroup regarding tribal involvement in EPA's Ecological Benefits Assessment Strategic Plan.
  - TSC member Charlotte Bertrand (EPA OEI) will contact EPA's Scientific Advisory Board (SAB) regarding (1) the activities being conducted by the SAB subcommittee working on Valuing the Protection of Ecological Systems and Services, and (2) tribal involvement in EPA's Ecological Benefits Assessment Strategic Plan. The plan is being prepared by a multi-disciplinary workgroup of EPA ecologists and economists as part of EPA's ongoing efforts to improve its ability to value the ecological benefits of EPA policies and procedures.
- Develop a TSC subcommittee for this topic.
  - The TSC will consider creating a TSC subcommittee for this topic pending the results of the above efforts.
- Hold a Tribal science workshop – similar to the national one done for Environmental Justice (EJ) community. This could possibly be combined with another tribal environmental conference.
  - The TSC will consider holding an EPA-sponsored tribal science workshop on habitat loss similar to the national conference for the Environmental Justice community. The TSC will assess interest from the tribal community on this action and consider conducting a workshop as part of a larger workshop on tribal science issues.
- Begin a regional or national speaker series and use video teleconferencing to link tribes, universities or other interested parties.
  - Once information is collected, the TSC will determine the most appropriate avenue for sharing this information with tribes.

Additional ideas that the TSC will consider at future meetings include:

- Coordinating funding sources for this kind of broad work. Possible mechanisms/resources include: Regional Applied Research Effort (RARE), Strategic Environmental Research and Development Plan (SERDP) from Department of Defense; Science to Achieve Results (STAR); National Institute for Environmental Health Services (NIEHS); NatureServe and Water Environment Research Foundation (WERF).

## ***Contaminated Precipitation***

### **Description:**

Power plants, mining operations, and incinerators release heavy metals (e.g., arsenic, lead, copper, mercury, and zinc) and other contaminants (e.g., NO<sub>x</sub> and SO<sub>x</sub>), into the atmosphere. These pollutants combine with water to form contaminated precipitation, which can enter terrestrial systems and impact human health and the environment. Of particular concern is the impact of airborne mercury deposition. In the United States, coal-fired power plants and incinerators are the largest sources of mercury emissions to the air, and mineral mining releases the largest amount of mercury to land. When mercury enters water, biological processes transform it to a highly toxic form that builds up in fish and animals that eat fish. People are exposed to mercury primarily by eating fish, and exposure to excessive levels can permanently or fatally injure the brain and kidneys. Women of child bearing age and young children are at particular risk from mercury health effects.

Tribal communities are particularly concerned with the impacts of airborne mercury deposition, as tribes that practice subsistence fishing and consume larger amounts of fish are at greater risk of direct health effects from consuming mercury-contaminated fish. In addition, for tribes that have traditionally depended on subsistence fishing and hunting practices, fish and game advisories encouraging tribes to reduce or discontinue consumption rates due to elevated mercury levels can result in severe impacts to tribal income and/or cultural practices.

Generally, tribes are interested in identifying and obtaining additional education and outreach opportunities to train tribes and develop tribal capacity for air monitoring and testing of airborne mercury deposition. Tribes are also interested in developing Regional and national air monitoring programs on tribal lands and would need both training and hardware for developing tracking and monitoring programs within Indian country.

### **Examples Where Tribal Impacts from Contaminated Precipitation are Felt**

- The impact of mercury deposition resonates on a nationally geographic level throughout tribal waters, lands, and resources. Several tribes have reported fish advisories such as: Penobscot (Maine); Cheyenne River Sioux (South Dakota); and Fond du Lac and Grand Portage Bands of Lake Superior Chippewa (Minnesota). Fish advisories prevent tribes' ability to maintain traditional tribal lifeways.
- Acid deposition is a major contributor to tribal water quality degradation. The pH levels are consistently driven below a value of six standard units—which is the tribal water quality standard of the Eastern Band of Cherokee Indians (North Carolina).

#### Efforts to Address This Issue:

Although tribes recognize that this is a pervasive issue and can likely only be solved by significant regulatory action to prevent the release of these pollutants, they identified a number of other requests that may help educate and inform tribal communities about the problems associated with mercury deposition in particular and contaminated precipitation more generally. A summary of these requests and efforts that are being initiated in response to the requests are provided below:

- Encourage alternative energy systems (e.g., wind and solar) and coordinate with pollution prevention staff in EPA Regions to explore other ways to prevent pollutants from entering the atmosphere.
  - TSC Members David LaRoche (EPA OAR) and Robert Hillger (EPA Region 1) will develop a list identifying EPA pollution prevention personnel from each EPA Region as a resource for encouraging alternative energy system implementation (e.g., wind and solar) by tribes.
- The TSC should obtain a copy of the Agency's Mercury research plan.
  - TSC Member Rita Schoeny (EPA OW) will provide a copy of the Mercury Action Plan, the multi-year plan, and the mercury portal link for distribution to the TSC.
- Hold a Tribal science workshop – similar to the national one done for Environmental Justice (EJ) community. This could possibly be combined with another tribal environmental conference.
  - The TSC will consider hosting an EPA-sponsored tribal science workshop on contaminated precipitation issues similar to the national conference for the Environmental Justice community.
- Begin a regional or national speaker series – use video teleconferencing like Region 1 does and potentially link up with Universities to involve Tribes.
  - Once information is collected, the TSC will determine the most appropriate avenue for sharing this information with tribes.

Other requests or recommendations that will be considered by the TSC at future meetings include:

- Encourage tribes to access money for risk assessment similar to what states are doing with respect to community level assessment guidance update (i.e. ATRA library Vol. 3) and community-based air toxics projects.
- Take advantage of money for community-based (not volunteer) programs.
- Get more tribal expertise and reps on the TSC from this and other science areas less focused on water.
- Consider holding a product expo (e.g., green building materials and alternative energy systems).
- Review EPA OAR's strategic plan, goals, and programs to identify potential opportunities for collaboration.
- Consider ways to encourage tribes to use funds available under Section 305(b) of the Clean Water Act to set up air monitors for mercury in air.

## ***Biological Stressors (e.g., algal blooms, cyanobacteria)***

### Description:

Biological stressors on water bodies can have a variety of impacts. Nutrient inputs generate bloom conditions of marine and freshwater phytoplankton and periphyton and can cause shifts in community composition to potentially toxic species. Algal blooms can result in fish kills, impact wading birds, and cause beach closures. For tribes who depend on impacted water bodies for fishing, bathing, drinking water and other uses, these stressors can have a significant impact on their lifeways.

### Efforts to Address This Issue:

Although EPA is developing nutrient criteria, and the Office of Water (OW) provides grants to help develop them, nothing is being done specifically regarding the impact of biological stressors on tribes. As a result, the TSC identified a number of potential efforts that may be able to help address the issue and its impact to tribal traditional lifeways. A summary of these requests is provided below. Unfortunately, the TSC has not yet explored these requests fully, so no specific responses have been developed to date.

### **Examples Where Tribal Impacts are Felt from Algal Blooms**

- Algal blooms caused by polluted lake waters impact the Miccosukee and Seminole Tribes in Florida. The Seminole Tribe has a reservation on the northern boundary of Lake Okeechobee. They draw water from the lake for irrigation purposes, and pollution from Lake Okeechobee can violate the tribe's water quality standards. The algal blooms also can impact the tribes through fish kills and impacts to wading birds.
- Algal blooms along the Salton Sea and in the Great Lakes cause fish die offs and beach closings that can impact neighboring tribes.
- The Penobscot Nation has been experiencing planktonic algal blooms since the mid-1990s. The worst bloom was experienced in 2004, with the bloom extending 100 miles from its origin. While the bloom was dominated by a species that did not produce toxins, species in the sample found in smaller quantities did produce toxins, similar to those found in ride-tide conditions. The bloom caused the Nation to suggest that community members not swim in the river or ingest river water.
- For decades, large mats of periphytic algae have occurred during low flow summer months along the Meduxnekeag River, home to the Houlton Band of Maliseet Indians. These algal blooms cause large diurnal shifts in dissolved oxygen content in the river waters and dramatically alter the physical and biological character of the river system.

- Contact the University of Washington's Pacific Northwest Center for Human Health and Ocean Sciences, which investigates how environmental conditions trigger blooms of harmful algae in marine waters and ultimately how these blooms impact human health. This is seen as an indicator that this problem is more national than initially thought.
- Implement and enforce nutrient criteria in National Pollutant Discharge Elimination System (NPDES) permits and water quality standards.
- Contact Office of Water and Regions about grants to develop nutrient criteria.
- Contact Regions and states about proposed Total Maximum Daily Loads (TMDLs) for nutrients. Encourage EPA to hold a tribal forum on TMDL studies to address non-point source pollution (NPS) contributions to nutrient loads.
  - Where possible, the actions and products should include a focus on risk (measurement and exposure), education, environmental justice issues, and/or restoration.

- Groups should consider whether or not this is a topic that someone from outside the TSC should be invited to speak on.
- The TSC should consider holding a conference call to discuss this priority in the spring/early summer so that tribes are more informed before summer – the times of worst blooms.

### ***Environmental Triggers for Respiratory Distress***

#### **Description:**

Estimates from the National Health Interview Survey (1986-1990) indicate that age-adjusted prevalence for asthma was 4.45 percent in Native American men and 6.02 percent in Native American women, while prevalence in white men was 4.26 percent and in white women, 4.30 percent. Respiratory illnesses are on the rise everywhere, and Reservation tribal members seem to be higher than the non-Indian population. While indoor triggers are addressed by tribal health departments, outdoor triggers, seem less defined. Some of the key environmental triggers of respiratory distress that the TSC will focus on include: mold (indoor emissions) and PM<sub>2.5</sub> and PM<sub>10</sub> (outdoor emissions). Given the elevated risk of respiratory illness found in Native American communities, tribes wish to have EPA better define these environmental triggers and work with other agencies in explaining the current tribally relevant research.

#### **Examples Where Tribal Impacts are felt from Environmental Triggers for Respiratory Distress**

Since 1993, California's Coachella Valley has been classified by EPA as a non-attainment area for PM<sub>10</sub> air emissions contributing to the incidence respiratory distress in these communities that impact a number of tribes living in the Valley including: Agua Caliente, Augustine, Cabazon, Torres-Martinez, and Twenty-Nine Palms. Fugitive dust sources are responsible for 97% of the PM<sub>10</sub> emissions, with construction activities, re-entrained dust from paved roads, and windblown dust from agricultural and disturbed lands representing the major sources.

Reports of are coming forth of skin infections and other serious health problems in Pine Ridge Tribal housing units that may be due to mold. Asthma and other respiratory ailments, to elevated glucose levels in other Indian communities due to mold/fungi infested housing are constantly surfacing and is an ever growing problem in Indian Country.

#### **Efforts to Address This Issue:**

The requests made by tribes on this issue focus on gathering existing data and research activities in this area. The TSC discussed this request and agreed to provide the tribal representatives with any information that was available as described below.

- Provide the tribal members with the current asthma statistics related to American Indians, including children, adults, men and women and provide information on current inter-agency research being done on environmental triggers for respiratory distress that looks at American Indians as a group apart from the general population.
  - TSC Members David LaRoche (EPA OAR) and Ella Mulford (EPA AIEO) will develop a status update on the work done to date on this topic, including gathering information on environmental triggers and

work being done by the Indian Health Service on household inspections.

### ***Environmental Triggers for Respiratory Distress Special Section on Mold***

#### **Description:**

Fungi, mold in this specific case, are in a completely different kingdom of organisms called Eumycota. They are eukaryotic having a well defined nucleus enclosed by a nuclear membrane, and the cells contain a cell membrane and the various cellular organelles making it similar to animal cells.

Molds are found virtually everywhere in the environment (over 200,000 species of fungi have been catalogued by scientists, at least 200 of these have been identified as familiar pathogens<sup>A</sup>). Mold in nature break down organic waste, and because of this they are readily found in building materials ranging from wood, drywall, stucco, sheetrock, wall paper, ceiling tiles, showers, and the lists goes on.

Whereas, much is known of viruses and bacteria, little is known of mold/fungi concerning indoor air quality. New research is coming forth showing a distinct link between mold and human health and disease. Mayo clinic discovered that fungi, and not bacteria, are the culprit behind chronic sinusitis.<sup>1</sup>

Why the interests in mold? Mold/fungi release secondary metabolites called mycotoxins. These are toxins produced by molds to defend against enemies in nature which are bacteria, viruses, and other organisms such as dust mites. The well known mold *Aspergillus* produces the powerful carcinogens aflatoxin, it is the only mycotoxin regulated in America, and "is the most carcinogenic chemical known to science"<sup>2</sup>, and ochratoxin. "Although aflatoxin is the most carcinogenic substance on the planet, ochratoxin beats it ten times over in terms of toxicity and damage inflicted on the human body"<sup>3</sup>.

Mycotoxins are relatively large and non-volatile molecules (do not readily release into the air themselves), so direct contact is mostly required. The mold overcome this due to the spores they produce and release into the air.

Exposure to molds and the secondary metabolites they produce are an area of growing concern in Indian Country. The routes of entry to the human body are mainly skin contact, and inhalation into the respiratory system.

On the Pine Ridge Indian Reservation, mold has been found in 75% of the 1,700 tribal housing units. Health effects range From chronic sinusitis, severe headaches, fungal skin infections In children and elderly, upper and lower respiratory illness, and On the fringe: reports of elevated cancer cases, and diabetes worsening. This black mold is causing many tribal members to become sick. The diabetes epidemic on the Pine Ridge Reservation alone is 800% higher than the U.S. national

#### **Black Mold**

- Found in 75% of the 1,700 tribal housing on the Pine Ridge Indian Reservation
- Causes sickness and poor health among tribal members
- Health effects include chronic sinusitis, severe headaches, fungal skin infections, upper and lower respiratory illness; cancer cases rising and diabetes worsening
- Diabetes found to be 800% higher on this reservation than U.S. national average

average of diabetes in a population.

Reports of asthma and other respiratory ailments, related to elevated glucose levels in other Indian communities due to mold/fungi infested housing are constantly surfacing and are an ever growing problem in Indian Country. The environmental impact of these organisms and their metabolites, how they affect indoor air quality, and human health is the primary concern of the EPA National Tribal Science Council. An organized effort needs to be launched in Indian Country to look into this issue which affects tribes across the United States.

#### References

A. Sugar, A. A Practical Guide to Medically Important Fungi and the Diseases They Cause. Lippincott-Raven. Philadelphia, PA. 1997.

1. Salvatore, S. Fungus causes most chronic sinusitis, researchers say. CNN report Sept. 9, 1999.
2. Etzel, R. Mycotoxins. Journal of the American Medical Association. 287(4). Jan23/30, 2002.
3. Kemin.com. Kemin Americas, Inc.: The Control of Mold and Mycotoxins in Ruminant Foods. Dec. 2002.

#### Efforts to Address this Issue:

The EPA's Office of Indoor Air and Radiation has developed a web site dedicated to the mold issue and has also produced two documents dealing with mold. The web site is located at <http://www.epa.gov/mold/moldresources.html>. The two documents are also located there and are (1) "A Brief Guide to Mold, Moisture, and Your Home" and (2) "Mold Remediation in Schools and Commercial Buildings". Both documents can be down loaded using the PDF format. The web site also lists other resources.

### ***Pharmaceuticals in Waste Water (including personal care products and antibiotics in livestock products)***

#### Description:

Pharmaceuticals and personal care products (PPCPs), (i.e., products consumed by individuals for personal health or cosmetic reasons), comprise a very broad, diverse collection of chemical substances. PPCPs can enter the environment when PPCP residues in treated sewage effluent are released from sewage treatment systems or when raw sewage is discharged directly to surface water. In addition, antibiotic can be released directly into surface waters from fisheries management activities and from livestock rearing activities (e.g., from direct waste run-off, use of manure as fertilizer for crops, etc.). While the risks posed to aquatic organisms and humans by PPCP and low-level antibiotics are essentially unknown, the issue is receiving increasing attention within Indian Country.

Many tribes are located in rural areas with septic systems that are located above groundwater sources. As insufficient information currently exists to adequately identify the impacts of PPCPs in wastewater on tribal communities, tribes feel that additional research is needed to assess the risks of residual PPCPs and low-level antibiotics from livestock operations and their impact on human health and the environment.

The TSC tribal representatives are interested in obtaining EPA's current status on the science, research, and policy development surrounding PPCPs and low-level antibiotics in wastewater. Tribes would like to be aware of the latest scientific developments with respect to this topic in order to respond more appropriately and effectively to this issue.

#### Efforts to Address This Issue:

EPA has already developed a comprehensive website on this topic. Although the site was not specifically developed for tribes, it contains a great deal of useful information on the issue. It can be found at <http://epa.gov/nerlesd1/chemistry/pharma/about.htm>. Tribal representatives indicated that more education was needed on this topic and recommended that the TSC focus their efforts on research and outreach on the following key questions:

- Are there alternatives to those pharmaceuticals and personal care products that are being detected in surface and wastewaters?
- Can wastewater be applied on land without adversely affecting the environment and human health?
- What are wastewater treatment options for eliminating pharmaceuticals and personal care products?
- What are the potential human health and environmental risks associated with exposure to these chemical substances?
- What are proposed uses of wastewater containing these compounds that could be responsible for adverse impacts to humans or ecological receptors?
- What is EPA's current research plan for PPCPs?
- What is EPA's current policy on PPCPs?
- What should we know about the potential adverse impacts to groundwater from aboveground septic systems?

In response to this overall request, the TSC is undertaking the following actions:

- TSC Members Ella Mulford (EPA AIEO) and Patti Tyler (EPA Region 8) will contact Christian Daughton and Rita Schoeny (EPA OW) will contact Octavia Connerly to find out more about what Agency information is available on this topic. The TSC plans to work with these individuals to develop some educational and training materials.
- TSC members will attend RTOCs/ROCs meetings and work with the RTOCs/ROCs to identify more examples of how this issue is impacting tribes.
- EPA will post relevant information collected on this issue on EPA's Science and American Indians website or the tribal portal, as appropriate.

## ***Dioxin and Dioxin-like Compounds***

### **Description:**

"Dioxins" refer to a group of chemical compounds that share certain chemical structures and biological characteristics and are formed as a result of combustion processes such as commercial or municipal waste incineration and from burning fuels (like wood, coal or oil). At high enough doses, dioxins may cause a number of adverse health effects, including skin disease, cancer, and reproductive or developmental impacts.

In general, tribes are disproportionately impacted by chemical contaminants in the environment through their resource use practices relating to traditional lifeways. The impact to tribes when tribal resources are contaminated extends beyond impacts to human health and the overall ecosystem to larger issues of tribal culture, spirituality, and lifestyle.

### **Examples Where Tribal Impacts are Felt by Dioxin and Dioxin-like Compounds**

- A recent study has shown significantly elevated levels of PCBs in breast milk of women from Akwesasne Mohawk Nation (New York), directly related to the consumption of contaminated fish, resulting in an advisory against breast feeding.
- Numerous tribes across the country have issued consumption advisories for dioxin and dioxin-like compounds, including Leech Lake Band of Ojibwe (Minnesota), Penobscot Nation (Maine), and Great Lakes Tribes.

Tribes are particularly interested in understanding the current state-of-the science at EPA relating to dioxins and dioxin-like chemicals that might impact tribal health and well-being, particularly in respect to tribal diet and cultural practices that may leave them at risk to environmental exposures.

### **Efforts to Address This Issue:**

Currently, EPA is working to develop a comprehensive reassessment of dioxin exposure and human health effects. EPA submitted a draft dioxin reassessment that updates a 1995 EPA inventory of dioxin sources and analysis of the source contributions to dioxin environmental levels to the National Academy of Science (NAS) for review. The NAS is working to provide an additional review to help ensure that the risk estimates contained in the draft are scientifically robust and that there is a clear delineation of associated uncertainties. Because the dioxin reassessment is now under review by the National Research Council (and publicly available), EPA will not likely be doing anything with the reassessment for the next year or two.

The TSC first identified dioxin as a tribal science priority in September 2002 when TSC tribal representatives were interested in learning the status of the Agency's dioxin reassessment and in lending support to the effort to make the assessment more accurate for tribal populations. Given the current status of the issue, in November 2004, the TSC agreed that the dioxin science priority should be expanded to encompass issues associated with dioxin and dioxin-like compounds, and should include:

- Dioxin Reassessment and Reference Dose;
- PCBs (co-planars);
- Burn Barrels (air emissions);
- Pulp and Paper Mills (air emissions and water discharges);

- World Health Organization's Toxic Equivalents (TEQ) (for use in human health & ecological evaluations); and
- Furans.

Based on this expanded scope, the TSC tribal representatives developed a list of requests related to research and education on these topics. Specifically, the representatives requested more information on the following issues:

- What Toxic Equivalents are and how are they derived (general description). A fact sheet would help with a more in depth discussion to follow if needed.
- Sources of dioxins and dioxin-like compounds and how these compounds are regulated.
- Major exposure pathways that would impact tribes.

Based on this request for additional information, TSC member Mike Callahan (EPA Region 6) will coordinate with EPA's National Center for Environmental Assessment (NCEA) and collect relevant information and work on this issue. Mr. Callahan will create a fact sheet that references these activities. TSC member Dana Davoli (EPA Region 10) will provide assistance with the development of the fact sheet.

Another recommendation that will be considered by the TSC at future meetings is reviewing the Office of Prevention, Pesticides, and Toxic Substances (OPPTS) Tribal Strategic Plan to see if there are any synergies (e.g., objective 4.3.2 refers to dioxin in Alaska, but this could be generalized to encompass all tribes).

### ***Persistent Bioaccumulative Toxics Source Reduction***

#### **Description:**

Persistent Bioaccumulative Toxic (PBT) pollutants are chemicals that are toxic, persist in the environment, bioaccumulate in food chains and, thus, pose significant risk to human health and ecosystems. Examples of PBTs include: aldrin/dieldrin, mercury and its compounds, chlordane, DDT, DDP, DDE, hexachlorobenzene, dioxins, furans, and PCBs. The biggest concerns about PBTs are due to the fact that they transfer rather easily among air, water, and land, and span boundaries of programs, geography, and generations.

In general, tribes are disproportionately impacted by persistent chemical contaminants in the environment because of their unique resource use that often occurs as a result of their traditional lifeways. The impact to tribes when tribal resources are contaminated extends beyond impacts to human health and the overall ecosystem to larger issues of tribal culture, spirituality, and lifestyle, particularly in relation to traditional dietary practices of

#### **Specific Examples Where Tribal Impacts are Felt from PBTs**

- Impacts to Aleutian food chain consisting of fish and marine mammals that are being impacted by persistent bioaccumulative toxic substances.
- Potential impacts of pesticide residues on crops in tribal communities.
- Repatriation of tribal artifacts that were contaminated during the preservation process.

tribal communities.

Tribes are interested in learning what EPA is doing concerning PBTs, both from a research and a regulatory perspective. In addition, tribes would like to see additional testing, outreach, and education for tribes on this issues and the development of a national strategy for testing subsistence foods.

#### Efforts to Address This Issue:

The TSC is working to identify efforts by which both (1) TSC efforts and (2) existing EPA initiatives and programs may be able to help address the issue of PBTs and its impact to tribal health and traditional lifeways. To help identify appropriate efforts and appropriate entities with whom the TSC can collaborate on this issue, the Council developed a list of questions to be addressed:

- What is the current list of PBTs?
- What research is being done on PBTs? (ORD, OPPTS, and OW)
- What regulator controls are in place to eliminate PBTs? (OPPTS and OECA)
- What is the process for getting new chemicals on the PBT list? Can Tribes propose chemicals to be added? (OPPTS)
- What are the impacts of PBTs on human health, particularly tribal, and the ecosystem? (ORD, OPPTS, and OW)
- How does the Agency assess emerging chemicals? Can the tribes propose emerging chemicals to the Agency for action? (OPPTS)
- What actions and/or products would the TSC like to pursue to help address this issue?
  - Need to develop general presentation on PBTs (What they are, how they operate, and why they are important to tribes) and current status on controlling PBTs, for a TSC conference call. (OPPTS)
  - More specific discussion could be warranted based on the presentations above. TSC to determine specific need.
  - An April to June timeframe for the first presentation was suggested.
  - Need to address the questions listed above.

### ***Endocrine Disruptor Chemicals***

#### Description:

In recent years, there has been increasing concern that chemicals (pesticides, commercial chemicals and environmental contaminants) might be disrupting the endocrine system of humans and wildlife. Chemicals with the potential to interfere with the function of the endocrine system are called endocrine disrupting chemicals (EDCs).

In general, tribes are disproportionately impacted by chemical contaminants in the environment through their resource use practices relating to traditional lifeways. The impact to tribes when tribal resources are contaminated extends beyond impacts to human health and the overall ecosystem to larger issues of tribal culture, spirituality, and lifestyle.

Tribes are particularly interested in (1) understanding the current state-of-the science at EPA relating to chemicals that might be disrupting the endocrine system of humans and wildlife, (2) education, training, and outreach opportunities to provide tribes with an opportunity to develop tribal capacity and participate in EDC research, and (3) tribally specific EDC research.

Efforts to Address This Issue:

The tribal representatives on the TSC developed some specific requests related to their overall interest in finding more out about this topic. These requests and the TSC's planned activities related to these requests appear below.

**Building Tribal Capacity for EDC Research**

In 2003, upon hearing from the Region 9 RTOC that EDCs were an important, emerging concern for EPA and that the Agency was actively developing analytical methods for EDCs and was planning to recruit outside laboratories to verify these EDC analytical methods, 29 Palms Laboratory proceeded to set up a molecular biology laboratory to perform EDC analysis and microbial source tracking. 29 Palms, an EPA- and state-sponsored tribal environmental laboratory, intends to build sufficient capacity to participate with EPA in developing expertise for EDC monitoring and microbial source tracking. To increase tribal participation, the laboratory is working with the Pyramid Lake Paiute Tribe's fisheries program to breed fathead minnows for developing and implementing the vitellogenin gene expression assay for estrogenic EDCs. The laboratory is also collaborating with EPA's Office of Research and Development to develop SOPs and QA plans for these technologies.

- Need to obtain an update of the work that the Agency is doing in the area of EDCs. Suggest that the update be general in nature and done on a TSC conference call.
  - TSC member Liz Resek (EPA OPPTS) will develop a written update on what EPA is doing in the area of EDC research and training.
- The TSC should develop more specific topic areas for in-depth presentations dealing with the impacts/effects on tribes and the science behind what we are doing based on the information presented on the call. This information could be conveyed to tribes through a workshop/breakout session that has three components: basic EDC 101 – What are EDCs, how do they operate and why are they important; what is the science behind the work that we (EPA) are doing; and what are the known impacts of EDCs on human health, particularly tribal, and on environmental well-being.
  - The TSC will form a subcommittee to determine what a Basic EDCs 101 course should address. The committee may include a representative from EPA AIEO, the Institute for Tribal Environmental Professionals, and the Tribal Air Monitoring Support Center and Dan Murray from EPA ORD. Following the training, there may be an opportunity for tribes to provide input into the list of chemicals to be tested to determine whether or not they should be listed as an EDC.
- Need to get to a wider tribal audience. This workshop/breakout should be presented at a tribal national environmental meeting such as the National Tribal Conference on Environmental Management.
  - The TSC will consider conducting a pilot via conference call to a certain number of Regions to communicate EDC information to tribes via phone.

The TSC will consider sponsoring a workshop/breakout session with three components on EDCs (i.e., Basic EDCs 101, the science behind what EPA is doing on EDCs, and known impacts of EDCs).



# Paper on Tribal Issues Related to Tribal Traditional Lifeways, Risk Assessment, and Health & Well Being:

## Documenting What We've Heard

April 2006



Developed by:

*The National EPA-Tribal Science Council*

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### Current Tribal Representatives:

Dan Kusnierz, Penobscot Nation  
Linda Logan, Tonawanda Seneca Nation  
Michael Bolt, Eastern Band of Cherokee Indians  
Troy Pierce, Poarch Band of Creek Indians  
Christine Berini, Fond du Lac Band of Lake Superior Chippewa  
Curtis Munoz, Kiowa Tribe  
Denise West, Winnebago Tribe of Nebraska  
Richard Janssen, Confederated Salish and Kootenai Tribes  
Vickie Kujawa, Flandreau Santee Sioux Tribe  
Marshall Cheung, 29 Palms Band of Mission Indians  
Dave Nelson, Cheyenne River Sioux Tribe

### Former Tribal Representatives:

James Ransom, Saint Regis Mohawk Tribe  
Brenda LaFrance, Mohawk Nation of Akwesasne  
Bernadette Hudnell, Mississippi Band of Choctaw Indians  
Steve Terry, Miccosukee Tribe of Florida  
John Persell, Minnesota Chippewa Tribe  
Kendal Coats, Muscogee (Creek) Nation  
Gina Kneib, Sac & Fox Nation of Missouri  
Fran King-Brown, Southern Ute Indian Tribe  
Kesner Flores Jr., Cortina Indian Rancheria  
Clay Bravo, Hualapai Tribe  
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OW Arnie Kuzmac  
ORD Harold Zenik

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# Table of Contents

<b>ACKNOWLEDGMENTS .....</b>	<b>2</b>
<b>PURPOSE OF THIS DOCUMENT .....</b>	<b>4</b>
<b>BACKGROUND .....</b>	<b>5</b>
<b>INTRODUCTION .....</b>	<b>7</b>
<b>WHAT IS RISK AND HOW DOES EPA USE IT? .....</b>	<b>8</b>
<b>SECTION I: CHANGING THE CURRENT RISK ASSESSMENT POLICIES AND PROCEDURES.....</b>	<b>12</b>
Increase Educational Opportunities for Tribes on EPA's Risk Assessment Process .....	12
Educating EPA on Tribal Values and Culture .....	13
Outreach and Involvement of Tribes .....	13
Valuation of Natural Resources .....	14
Data Collection and Use .....	15
Unique Tribal Exposures .....	17
<b>SECTION II: DEVELOPING A NEW PARADIGM.....</b>	<b>22</b>
Incorporate a Health-based Focus .....	22
Focus on Risk Prevention .....	22
Incorporate Cumulative Impacts .....	22
Create a Holistic Paradigm---One that Incorporates Impacts to Community Health, Culture, Lifeways, Well-being and the Environment .....	22
Include Health and Wellness Indicators .....	23
Use a Cross-Media Approach .....	25
Reflect the Precautionary Principle.....	25
Recognize that for Some Tribes, a "Zero Contamination Policy" Exists .....	25
Work with Tribes on a Government-to-Government Basis .....	25
<b>SOURCES AND REFERENCES .....</b>	<b>27</b>

## **Purpose of This Document**

This document is meant to consolidate the many issues and ideas that have emerged from the various workshops that the National EPA-Tribal Science Council (TSC) has held on the topic of risk assessment, health and well-being, and tribal traditional lifeways. It is intended to serve as a starting point for discussion by EPA staff as to potential approaches for addressing some of these issues from an EPA perspective. Although it was not written by tribes, it is meant to capture tribal perspectives that emerged from these events.

## Background

In September of 2002, the TSC tribal representatives formally identified tribal traditional lifeways and subsistence as their highest priority science issue, with a focus on both looking at ways to integrate tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment policies and procedures as well as discussing development of a potential new environmental decision-making paradigm, one focusing on human health and ecological well-being.

This issue impacts tribal communities throughout Indian Country. Tribes assert that EPA's current risk assessment policies and procedures are not protective of tribal resources and lifeways, and are not adequate to account for or include a holistic approach for assessing the social, cultural, and spiritual values, beliefs, and practices that link tribal people to their environment. Current risk scenarios and risk factors are geared toward urban settings in the United States. They were not developed with subsistence lifestyles in mind, and, therefore, tribes that practice tribal traditional lifeways that focus on subsistence practices or lifestyles outside the "mainstream" are less protected since they are subject to increased exposure. In addition, the risk management solutions identified from the current risk assessment methodologies often force tribal populations to alter activities that are essential to their existence, such as those constraints imposed by the creation and adoption of fishing and hunting advisories.

Tribes wish to play an integral role in developing improved risk assessment policies and procedures within the Agency. In addition, they ask that EPA allow for increased consultation and coordination with tribal governments when risk assessment and management activities are undertaken that potentially impact their lands, resources, and cultural practices. As sovereign nations, tribes assert that they possess a legal and moral right to be involved in decision making that affects their people, lands, and aboriginal and treaty rights due to the federal trust responsibility, which arises from Indian treaties, statutes, executive orders, and the historical relations between the United States and Indian tribes.

This trust responsibility is underscored by EPA's Indian Policy, which supports tribal "self-government" and "government-to-government" relations between federal and tribal governments. Under EPA's 1984 Indian Policy, EPA recognizes tribal governments as sovereign entities with primary authority and responsibility for the reservation populace. Accordingly, EPA will work directly with tribal governments as the independent authority for reservation affairs, and not as political subdivisions of states or other governmental units.

Formed in 2000, the National EPA-Tribal Science Council's mission is to provide a forum for tribes and EPA to work collaboratively to identify and address national environmental science issues of importance to both tribes and EPA. To ensure that the TSC has a national and cross-program perspective, it is composed of a single tribal representative from each EPA Region with federally recognized tribes, a tribal representative from Alaska, and an Agency representative from each EPA Program and Regional Office.

The TSC tribal representatives formally raised the issue of tribal traditional lifeways and subsistence lifestyles and their lack of representation in current risk assessment policies and procedures as a priority for the Council to address in September 2001; this issue was reiterated as a tribal science priority by the Council in November 2004. To address the issue, the TSC decided to focus on both the short-term goal of integrating tribal traditional lifeways and subsistence lifeways into EPA's risk assessment process and the more long-term goal of developing a new environmental decision-making paradigm for EPA consideration, one focusing on human health and ecological well-being. Specifically, the TSC has sponsored three workshops that have brought together tribal representatives and risk experts to help advance its thinking on these topics over the past two years. They have included the following:

TSC Workshop on Health & Well Being and Risk Assessment held in Albuquerque, NM on February 19-20, 2003. The purpose of this workshop was to convene specific tribal representatives working on addressing these topics and EPA staff experienced with the risk assessment process to gain a better understanding of the issue and better insights into the way EPA and tribes view the current risk assessment process.

TSC Workshop on Health & Well Being and Tribal Traditional Lifeways held in Reno, NV on May 13-15, 2003. The purpose of this workshop was to share the health and well-being concept with a broader audience and get feedback that would help build on information collected during the "National Subsistence Technical Planning Meeting for the Protection of Traditional & Tribal Lifeways" hosted by the Alaska Native Science Commission in Alaska in April 2003.

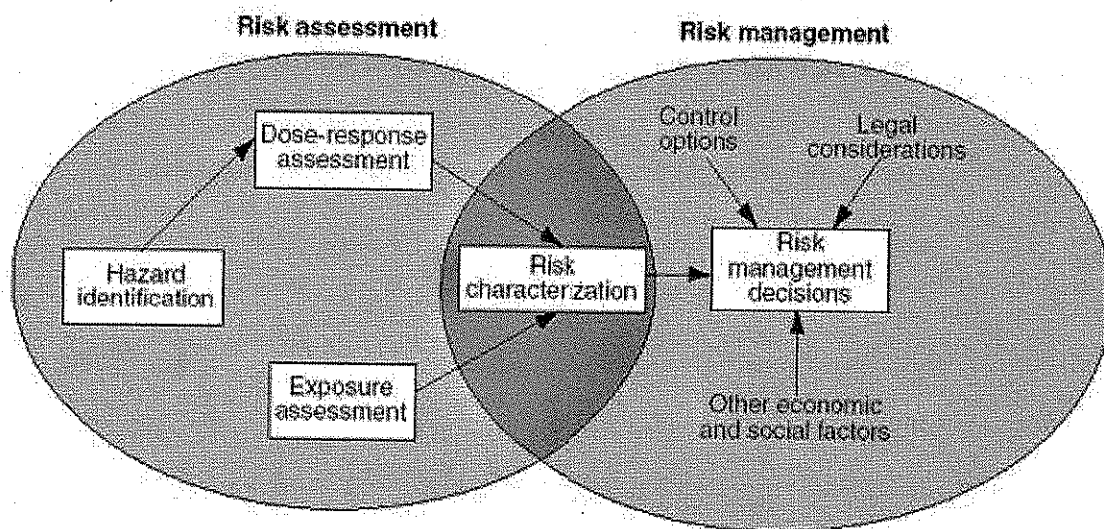
TSC Workshop on Addressing Tribal Traditional Lifeways in EPA's Risk Assessment Policies and Procedures held in Reno, NV on January 24-27, 2005. The purpose of this workshop was to convene a group of tribal representatives working in the area of risk assessment and a broader audience of observers to talk about both short-term things that EPA and tribes could do to address the current risk assessment process and identify approaches for more long-term changes that are more tribally appropriate.

## Introduction

The three TSC workshops resulted in a great deal of discussion by tribal representatives both on the short-term goal of integrating tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment process and the more long-term goal of developing a new environmental decision-making paradigm for EPA consideration. The following sections highlight and categorize some of the issues, ideas, and comments presented by the tribal representatives as these workshops. Section I presents the information provided during discussions by tribal participants regarding improving EPA's current risk assessment process through the integration of tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment policies and procedures. Section II presents the information provided by tribal representatives regarding the potential development of a new environmental decision-making paradigm that would focus on human health and ecological well-being.

## What is Risk and How does EPA use it?

Generally, risk refers to the possibility of injury, harm, or other adverse and unwanted effects. The analysis, management, and communication of risks to human health and safety and environmental quality is the foundation for the risk assessment paradigm. The National Academy of Sciences (NAS) published the environmental risk assessment paradigm (Figure 1) in 1983, National Research Council. The NAS concluded that the paradigm consists of two separate elements - risk assessment and risk management. NAS defines risk assessment as “a process in which information is analyzed to determine if an environmental hazard might cause harm to exposed persons and ecosystems.”



Source: EPA Office of Research and Development.

Figure 1. Diagram of risk assessment paradigm

EPA uses the paradigm and definitions published by NAS as their basic approach in assessing and managing environmental risks. The overall process provides a way for EPA's environmental decision making including legal, regulatory, policy and criteria. Figure 1 shows the basic steps in the assessment of human health risk. While ecological risk assessment uses a different framework, both frameworks provide the scientific data and information from the assessment that feeds into risk management decisions that also considers other legal, economical, social, other factors.

Whether one is assessing human or ecological risk, EPA uses relevant data and information to the extent possible; limitations on data use can include lack of appropriate peer review, unacceptable quality, an inability to make the information available to the public or ethical considerations. Where relevant chemical- or exposure-specific data cannot be found or can't be used, EPA employs default assumptions and extrapolations to fill in the data gaps so that the risk assessment process can proceed. Use of defaults and assumptions is described in detail in *Risk Assessment Principles and Practices* (U.S. EPA, 2004). Occasionally, the results of hazard

identification and dose response are published separately and represent many people in the United States. For example, the EPA Integrated Risk Information System (IRIS) provides this type of information to assist risk assessors, who must perform their own exposure assessment and characterization of risk. Additional details for both the human and ecological risk assessment processes are described below.

### **Human Health Risk Assessment**

EPA has developed Guidelines for assessing risk to humans that follow the four steps in Figure 1: Hazard Identification, Dose-Response Assessment, Exposure Assessment, and Risk Characterization.

#### Hazard Identification

This step poses some fundamental questions. Does this environmental contaminant pose a hazard to humans? Does it cause cancer, kidney damage, developmental effects or some other health endpoint? EPA generally uses a weight of the evidence approach in these decisions. All data on studies in humans, animals or *in vitro* tests are evaluated for quality and as to whether they demonstrate an effect. Both positive data and those which do not show an effect are considered using frameworks established in these EPA publications: *Guidelines for Mutagenicity Risk Assessment* (U.S. EPA, 1986a); *Guidelines for Developmental Toxicity Risk Assessment* (U.S. EPA, 1991); *Guidelines for Reproductive Toxicity Risk Assessment* (U.S. EPA, 1996); *Guidelines for Carcinogen Risk Assessment* (U.S. EPA 1986b, revised U.S. EPA 2005). These guidelines provide a framework for evaluating data and choosing the mode of action whereby the contaminant produces its effect

#### Dose-Response Assessment

This is the step which determines the potency of the contaminant in producing health effects. The dose response assessment may estimate a level of exposure without appreciable risk or a level of risk at a particular exposure. Generally, the dose-response assessment consists of two parts: the evaluation of data in the observable range, and the extrapolation from the observable range to low doses. In the first part, the risk assessor may apply a biologically based model or fit a mathematically derived curve to the data for an effect, such as tumors observed in rats. The choice of extrapolation method below the point of departure depends on consideration of the mode of action. When the mode of action implies a threshold, EPA generally calculates a reference dose or reference concentration (RfD or RfC), by dividing the point of departure by a series of factors to account for variability and uncertainty. The methodology can be found in *A Review of the Reference Dose and Reference Concentration Processes* (U.S. EPA 2002). When the mode of action implies linearity of response at low dose, then procedure is to draw a line from the point of departure through the origin of the dose response curve. The estimate of potency is the slope of the line. For contaminants thought to be carcinogenic, low dose linearity is the default when the mode of action is not known.

#### Exposure Assessment

In this step the risk assessor determines how people are exposed or come in contact with the contaminant. Is it inhaled, eaten in foods, ingested in water or is there some other route of exposure? The risk assessor will estimate the amount of contaminant to which different

populations will be exposed. In the best circumstances this estimate will use data specific to the population in question; most often it will use models or rely on defaults for amount of air inhaled, amount of soil ingested and so on. If the data and methods are available, exposure assessment will include estimates of the amount of contaminant which reaches the target organs. *EPA has published Guidelines for Exposure Assessment* (U.S. EPA 1992) as well as an *Exposure Factors Handbook*, (U.S. EPA 1997) listing defaults for ingestion, body weights and so forth; the latter document is being updated.

### Risk Characterization

This final step combines all the information and judgments from hazard identification, dose response and exposure assessment. The risk characterization should include a description of the nature and magnitude of the risk, an interpretation of the adversity of the risk, a summary of the confidence or reliability of the information available to describe the risk, areas of where information is uncertain or lacking completely, and documentation of all of the evidence supporting the characterization of the risk.

The risk characterization can take many forms and be more or less lengthy. For example, in the Mercury Study Report to Congress, the risk characterization comprised an entire volume, which provides estimates of numbers of people at risk, who was particularly susceptible, extent of risk to wildlife, and a comparison of the magnitude of risks between wildlife and humans. In all cases, EPA's Risk Characterization Policy (U.S. EPA 2000) requires that the risk assessment be transparent, clear, reasonable and consistent with other assessments of similar scope. Whenever supported by data and methods, the risk characterization will include not only descriptions of uncertainty and variability, but also quantitative estimates of uncertainty or variability.

### **Ecological Risk Assessment**

Ecological risk assessment "evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors" (U.S. EPA, 1992a). The process is used to systematically evaluate and organize data, information, assumptions, and uncertainties in order to help understand and predict the relationships between stressors and ecological effects. An assessment may involve chemical, physical or biological stressors, and one stressor or many stressors may be considered. Ecological risk assessment provides valuable information for environmental decision making by giving risk managers an approach for considering available scientific information along with the other factors needed to consider (e.g., social, legal, political, or economic) in selecting a course of action.

Ecological risk assessment includes three primary phases: problem formulation, analysis, and risk characterization. In problem formulation, risk assessors evaluate goals and select assessment endpoints, prepare the conceptual model, and develop an analysis plan. During the analysis phase, assessors evaluate exposure to stressors and the relationship between stressor levels and ecological effects. In the third phase, risk characterization, assessors estimate risk through integration of exposure and stressor-response profiles, describe risk by discussing lines of evidence and determining ecological adversity, and prepare a report. The interface among risk assessors, risk managers, and interested parties during planning at the beginning and

communication of risk at the end of the risk assessment is critical to ensure that the results of the assessment can be used to support a management decision.

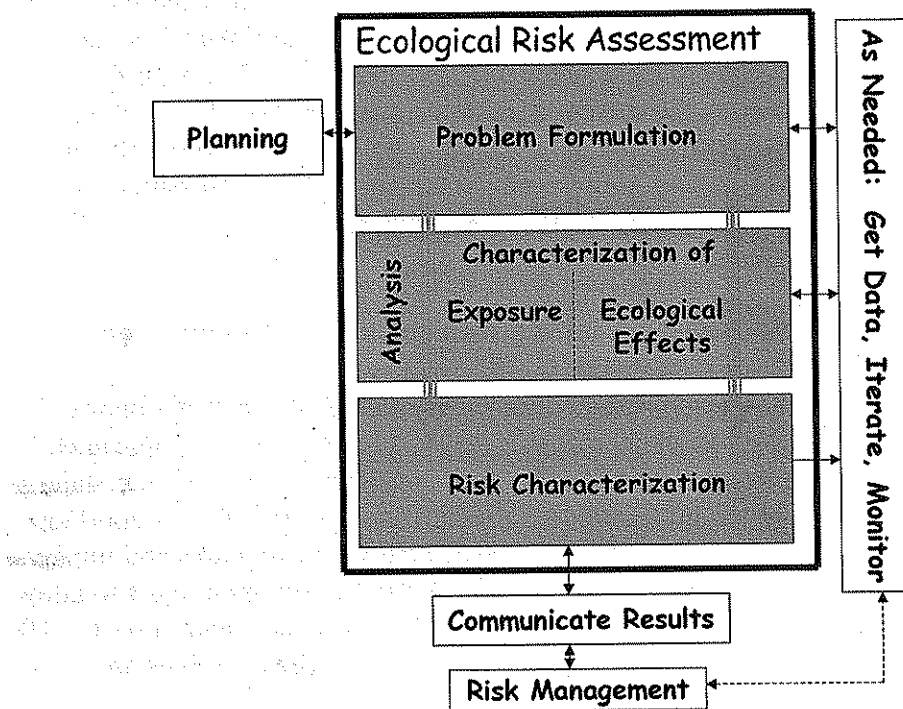


Figure 2. Diagram of Ecological Risk Assessment

## **Section I: Changing the Current Risk Assessment Policies and Procedures**

Although tribes have expressed interest in having EPA develop a new, more tribally appropriate decision-making process that would serve as an alternative to the current risk assessment paradigm, a significant number of the discussions the TSC has had with tribes have focused on changes that could be made to improve the current risk assessment process. The sections that follow highlight the various issues that were raised by tribal representatives during the three workshops convened by the TSC regarding how to change the current risk assessment process to be more reflective of tribes' needs in the near term. The issues are presented in no particular order.

### **Increase Educational Opportunities for Tribes on EPA's Risk Assessment Process**

In general, tribal representatives have expressed a need for increased educational opportunities about risk-related topics. As a workshop panel member at the 2005 Reno workshop, stated, a disconnect exists between data collection efforts and how this data is utilized to understand human, ecological, and community impacts. Additional education and training is important in enabling tribal members to better understand the risks associated with exposures and impacts. In the short-term, EPA should support and develop education and risk assessment tools to allow tribes to better utilize environmental and risk data to reduce their exposures and impacts. (2005 Reno pg 25-26) The specific educational topics identified by tribal representatives are described below.

#### ***Risk Assessment Paradigm***

At the 2003 Albuquerque workshop, a tribal participant indicated that tribes frequently do not grasp their regulatory situation and the implications of ARARs and NEPA/CERCLA/NRDA processes involving risk assessment and associated data collection. (2003 Albuquerque, pg 16) Although EPA presented a half-day risk assessment training course at the 2005 Reno workshop that provided participants with an overview of basic risk assessment terminology and processes, tribal participants indicated that they would have preferred a course that was longer and more tribally focused. A participant suggested that a full- or 3/4-day training course on risk assessment would have better educated participants on the basics of risk assessment. There was general agreement from training participants that those providing risk assessment training to tribes should have experience working with tribal communities and possess an understanding of tribal structure, culture, and lifeways. Participants felt that any risk assessment training provided to tribes should provide real-life examples and case studies specific to Indian Country. (*Tribal Science Council Risk Assessment/Health & Well-being Workshop: Training Evaluation Summary, Comments Summary.*)

#### ***Risk Communication***

At the 2005 Reno workshop, a tribal participant indicated that there is often a

misconception by tribes that they will be able to use risk assessment data to identify and prove the source of health impacts within their community. Tribes are often disappointed by the risk assessment process when clear health impacts cannot be demonstrated. (2005 Reno, pg. 18) Additional education and training are needed so that tribes understand how risk assessment data are used to understand human, ecological, and community impacts and how this information is then utilized in risk management decision making.

#### ***Risk Ethics and Informed Consent***

When working with tribes on risk assessment studies and gathering potentially sensitive tribal data, it is important that tribes are educated on issues of informed consent and risk ethics, ensuring that tribes are provided adequate information on both the possible risks and the potential benefits of their involvement to allow them to make informed decisions as to whether and how they wish to be involved in risk assessment processes. During the 2005 Reno workshop, a participant representing a tribal organization identified the specific need for training on risk ethics and informed consent, highlighting the advantages and possible disadvantages of tribal participation in the risk assessment process. (2005 Reno, pg. 24)

#### **Educate EPA on Tribal Values and Culture**

At the 2003 Reno workshop, there was general consensus that tribal communities need to be involved in educating EPA on tribal values and in changing Agency culture to allow for tribal issues and concerns to be recognized and incorporated into policy decisions. (2003 Reno, pg. 12) During the 2003 Reno workshop, a tribal speaker reflected this sentiment more broadly, indicating that tribes need to educate the outside world as to the needs and values of native peoples. (2003 Reno, pg. 10)

#### **Outreach and Involvement of Tribes**

In a number of discussions, tribal representatives have emphasized the importance of early and continued involvement by tribes throughout the risk assessment and risk communication process. Workgroup members at the 2005 Reno workshop, made a number of suggestions for promoting early and continued communication with tribes, with the goal of improving risk assessment policies and procedures. These included:

##### ***Tribal Consultation***

Efforts are needed to ensure that tribes are appropriately consulted on risk assessment activities, particularly in respect to gaining insights into potential historical observations regarding environmental impacts and change. (2005 Reno, pg. 10-11) During the 2003 Albuquerque workshop, a tribal representative observed that consultation with tribes during the risk assessment process is vital. She observed that the key to defining risk lies in defining risk from a tribal community's perspective and noted that EPA and tribes often possess differing views on risk. EPA is often addresses risk from a media-focused, media-driven perspective and tribes are often most concerned with the direct impacts of various risk factors on the community as a whole. As a result, government-to-government consultation between EPA and individual tribal governments is extremely

important to allow for adequate risk characterization and definition. (2003 Albuquerque, pg. 6) However, additional clarification is needed in defining how tribal consultation will occur in terms of both site-specific (e.g., Superfund site cleanup) and national-level processes (e.g., establishment of drinking water standards and re-registration of pesticides). Clarification is also needed regarding with whom the Agency will consult (e.g., tribal government, tribal elders, tribal organizations, etc.). A suggestion was made during the 2005 Reno workshop, that the tribal consultative process being developed by the EPA American Indian Environmental Office (AIEO) be incorporated into any tribal collaboration and communication efforts involving the development of new risk assessment policies and procedures. (2005 Reno, pg. 28)

#### ***Formal Agreements Regarding Decision Making***

EPA and tribes should enter into a formal agreement prior to the planning and problem formulation phase to generate a two-way conversation regarding the issues involved and to provide an opportunity for the tribes involved to identify their unique questions and concerns. At the 2005 Reno workshop, participants indicated that EPA and tribes should hold upfront discussions to determine how information generated during the risk assessment will be used and that tribes should be allowed to enter into a co-decision making process if tribal lands may be impacted. (2005 Reno, pg. 10-11)

#### ***Resources for Tribal Involvement***

In addition, when providing for appropriate involvement and coordination with tribes, consideration needs to be given to ensure that tribes possess sufficient resources to be able to participate. During the 2005 Reno workshop, there was general agreement from participants that a number of tribes lack sufficient technical and financial resources to assess and manage risks, while at the same time these tribes often have to contend with large tracts of land, cross-media contamination, and long- and short-term exposures. (2005 Reno, pg. 29) At the 2003 Albuquerque workshop, participants reported that the funding made available for tribes for risk assessment is "woefully inadequate and inconsistent." (2003 Albuquerque, pg. 16) For tribes to be effectively involved, they need to possess sufficient resources, such as, travel, funding for participation, research, etc. (2005 Reno, pg. 11)

#### ***Valuation of Natural Resources***

During the 2005 Reno workshop, a TSC member observed that one of the major reasons that risk assessment does not work well in Indian Country is that a disconnect exists in the way that tribal and non-tribal communities value the environment and their resources. (2005 Reno, pg. 19) While EPA factors economic considerations into its risk management decisions, thereby necessitating that an economic (dollar) value be placed on natural resources, many tribal communities do not accept monetary valuation of their resources. Some tribal representatives have indicated that valuation metrics that do not involve the concepts of "Western economies" are needed. (2005 Reno, pg 29) At the 2003 Albuquerque workshop, a suggestion was made by a tribal member that traditional economic variables that are used by the Agency be replaced with "economic" variables of consequence to tribal communities, such as relating things in

terms of valued tribal resources (e.g., number of moose hunted by a tribe). (2003 Albuquerque, pg. 11)

### **Data Collection and Use**

During the three workshops, tribal representatives identified a number of issues related to data collection and use within the context of risk assessment processes. These issues, which included the need to incorporate both tribal traditional knowledge and qualitative data into the risk assessment process, the need to develop methods for ensuring appropriate collection of data from tribal sites, the need to ensure data ownership by tribes and to protect confidentiality of tribally sensitive data, and the need to improve quality assurance of tribal data. Each of these issues is further explained below.

#### ***Incorporate Tribal Traditional Knowledge***

Many tribal representatives participating in the TSC workshops emphasized that tribes possess a great deal of observational and experiential knowledge about their environment. They indicated that this knowledge, often referred to as tribal traditional knowledge and tribal ecological knowledge, should be incorporated into existing risk models and scenarios. At the 2003 Albuquerque workshop, a tribal representative observed that the work that EPA is conducting on risk assessment is not new and that tribes have observational and experiential knowledge with the issue dating back for centuries. She observed that when developing tribal risk assessments, this direct observational and experiential knowledge needs to be incorporated. She explained that in tribal communities, this type of direct observation, experience, and habituation, which is handed down by the generations, is held to be much more truthful than secondhand knowledge, represented by the traditional Western science methodology of gathering and incorporating scientific data into reports. (2003 Albuquerque, pgs. 5-6)

During the 2005 Reno workshop, it was indicated that both "Western" science and tribal traditional knowledge need to be recognized as forms of science (2005 Reno, pg. 15), that tribal traditional knowledge should be included as an input into risk assessment on equal footing with scientific data (2005 Reno, pg. 27), and that guidance is needed on where and how to include tribal traditional knowledge into the risk assessment process (e.g., in identifying appropriate sampling sites and sampling periods.) (2005 Reno pg. 28)

In a related discussion at the 2005 Reno workshop, a tribal representative spoke of the need for generating valid ethnographic data to use in risk assessment processes, noting that anecdotal tribal information should not be dismissed, but that care should be taken to ensure that the data is valid (i.e., that the data collected are systematic and repeatable and are considered "good data"). (2005 Reno, pg. 24)

#### ***Incorporate Qualitative Data***

At the 2005 Reno workshop, there was discussion on the need to incorporate qualitative, rather than strictly quantitative, data into EPA's risk assessment process, particularly as some tribal members indicated that they did not agree that spiritual and cultural aspects

of a tribe's lifestyle could be quantified. (2005 Reno, pg. 22) Methods are needed for incorporating this qualitative information into the risk assessment process so that it is provided to decision makers when making risk management decisions. At the January 2005 workshop in Reno, NV, there was recognition that both qualitative and quantitative approaches to risk assessment exist and that debate on these issues is healthy. (2005 Reno, pg. 28) A tribal representative indicated that qualitative data should be allowed to be brought into the risk assessment process and given equal weight with quantitative data. (2005 Reno, pg. 23) Several workshop panel members agreed that more discussion is needed as how best to incorporate qualitative data inputs into the risk assessment process in an equitable way, as risk assessments are constrained by current laws and mandates. (2005 Reno, pg. 25)

#### ***Appropriate Data Collection from Tribal Sites***

Tribal members noted on various occasions that the samples and data collected for risk assessment purposes from tribal sites was often done without tribal involvement, and, therefore, was not representative of the impacted tribe's health and lifeways. At the 2005 Reno workshop, a TSC tribal representative indicated the need for tribes to be involved in the planning and development of risk assessments, particularly in regard to sampling protocols to determine where and when to sample and, in the case of fish sampling, what parts of the fish to sample. (2005 Reno, pg. 18) In addition, during the 2003 Albuquerque workshop, a tribal representative spoke of her experience involving baseline human health risk assessments conducted on lands on the Akwesasne Reservation in New York. She highlighted a number of instances in which the tribe felt that tribal concerns were not taken into account during data sampling and collection. These included the lack of data on consumption rates for women of child bearing age in the assessment, the collection of data on limited stretches of the river system that was impacted, and limited data on only two fish species that were not considered to be the most important species by the tribal community. (2003 Albuquerque, pg. 13)

#### ***Data Ownership and Confidentiality***

The issue of data confidentiality and ownership is very important to tribal communities, who can be reluctant to provide sensitive tribal data to outside entities. Such a reluctance to share data can impact risk assessment processes. As noted by an EPA representative at the 2005 Reno workshop, a major obstacle to complete the Tribal LifeLine Project has been EPA's ability to access tribal data. (2005 Reno, pg. 20)

Data access and ownership is particularly problematic due to concerns by tribes that providing tribal data and information driving risk assessment studies will subject the data to become publicly available under Freedom of Information Act (FOIA) requirements. A tribal representative at the 2005 Reno workshop, indicated that, recognizing the need to work within the framework of the existing risk assessment framework and within the parameters of FOIA, tribes should be educated on the various options that exist for protecting tribal data while working within these structures. A tribal representative observed that tribal exposure models are each context-specific, and,

therefore, there are ways to include cultural impacts and risks in a general way that would allow tribes to use these models. (2005 Reno, pg. 23)

#### ***Quality Assurance of Tribal Data***

Some frustration was voiced that, in the past, EPA has rejected tribally developed data from risk assessment studies. (2003 Albuquerque, pg. 13) During the 2005 Reno workshop, a tribal representative emphasized that in developing tribal exposure assessments, it is necessary to gather peer reviewed data that meet the strict rules of evidence and are well documented. During the workshop, it was also suggested that collaboration between EPA and tribes is needed to ensure that the data developed by tribes is considered valid and is accepted under EPA's laboratory standards. (2005 Reno, pg. 29) and that additional focus on data quality assurance standards is needed to ensure that the data developed and provided is valid and will be accepted by EPA.

#### **Unique Tribal Exposures**

Tribal representatives have asserted that current risk assessment policies and procedures do not take into account or allow for unique characteristics of tribes and tribal communities that create unique tribal exposures, and, therefore, are not fully protective of tribal health and lifeways. Throughout each of the three workshops, tribal members discussed numerous aspects of tribal communities and tribal lifestyles that result in their unique exposure factors, including:

***Tribes Represent Relatively Small Populations:*** At the 2005 Reno workshop, a tribal member indicated that tribal populations are unique because they possess relatively small population numbers in comparison to the general U.S. population. As a result, the individual indicated that tribes are unique in facing the possibility of cultural loss and even extinction in the face of environmental hazards. The tribal member suggested that EPA consider different standards and a different definition of "population" where tribal communities are involved. (2005 Reno, pg. 9) Small population size also makes it difficult for many tribes to demonstrate significant human health impacts during standard risk assessments so as to warrant action by regulators. As noted by a tribal representative at the 2005 Reno workshop, within existing risk assessment models, many tribes are not large enough to register a population impact or "cancer cluster;" therefore, many tribes are trying to identify other environmental indicators to demonstrate environmental impact. (2005 Reno, pg. 25)

***Tribes are Tied to Fixed Land and Resource Bases:*** At the 2005 Reno workshop, a tribal member indicated that tribes are unique in that tribal communities are tied to their lands and are not able to simply move away from contamination sources when impacts occur. (2005 Reno, pg. 29) In addition, at the 2005 Reno workshop, a TSC representative observed that tribal resources and their value to the tribe are very much tied to their lands and their geographic proximity. He described an instance in which a biological opinion paper developed by the U.S. Fish and Wildlife Service (USFWS) for bald eagles nesting along the Penobscot River was developed. The risk assessment conducted by USFWS concluded that the population of eagles in the entire Northern States Recovery Region (comprising 24 states) would not be jeopardized if the eagles

along the river were removed and, therefore, allowed the “taking” to occur. However, the eagles were part of the Penobscot Indian Reservation, and the cultural impact to the tribe from the loss of the eagle community on their Reservation was never considered in either the risk assessment or risk management decision processes. At issue was the fact that it was the eagle population within the Reservation to which the tribe has close cultural connections and, therefore, impacted the tribe and not the eagles elsewhere in the country. (2005 Reno, pg. 18-19)

***Tribes Possess Unique Dietary, Religious, and Cultural Practices:*** As discussed during the 2005 Reno workshop, each tribe possesses a unique variety of tribal practices, including tribal diets, religious practices, and cultural practices (e.g., basket making, use of medicinal plants, and sweat lodge ceremonies) that should be factored into tribal exposure scenarios. (2005 Reno, pg. 28) Recognition is needed that impacts affecting tribal culture and diet greatly impact tribal health. (2005 Reno, pg. 29) During the 2003 Reno workshop, a tribal participant indicated that exposure scenarios need to be reflective of tribal lifestyles and consumption patterns. As an example, they observed that a number of tribes living “subsistence lifestyles” consume large quantities of a variety of fish species, which can complicate the development of accurate exposure scenarios, and that, for many tribes, fish advisories restricting or eliminating fish consumption are not a viable risk management solution, as, for many, tribes cannot give up their lifestyle practices in response to fish advisory warnings. (2003 Reno, pg. 24)

To help address these unique tribal exposures within the current risk assessment process, various suggestions were provided by the tribal representatives attending the workshops. These suggestions are outlined below.

***Include More Sensitive Populations***

At the 2005 Reno workshop, a tribal representative indicated that the current risk assessment processes needs to be improved to better include more sensitive populations, expanding current models, which focus mainly on exposures to the general U.S. population. (2005 Reno, pg. 17)

***Demonstrate Care When Developing “Tribal Default Values”***

EPA, in its *Exposure Factors Handbook*, summarizes data on human behaviors and characteristics affecting exposures and provides recommended exposure factor values. These recommended exposure factor values can serve as “default values” to be used by risk assessors when sufficient site-specific data for a specific geographic population is not available. These default values are generally based on the typical U.S. suburban population.

At the 2003 Albuquerque workshop, participants discussed the need to develop default exposure values that are more applicable for tribal communities than the current default values developed for the “general population.” However, tribal representatives expressed concerns that the default values developed for a particular tribe under a particular set of conditions could be construed as being “the tribal default values example,” which would

then be factored into all future tribal risk assessments. (2003 Albuquerque, pg. 19) During the workshop, a tribal representative had reported that the Shoshone-Bannock Tribes have experienced problems with this, involving a contractor that wished to utilize the default values developed by Barbara Harper for another tribe and extrapolate them for a risk assessment being developed for the Shoshone-Bannock Tribes. (2003 Albuquerque, pg. 16) Tribal representatives indicated that, where possible, default values should be replaced by the best available data for a given tribal community. (2003 Albuquerque, pg. 18)

When, during the *2005 Reno workshop*, a suggestion was made to develop a separate "tribal" exposure factors handbook, a tribal representative cautioned against development of a separate exposure factors handbook for tribes, observing that mainstream exposure factors should be the goal, focusing on the protection of all vulnerable populations. (2005 Reno, pg. 11-12)

#### ***Develop Tribal Exposure Scenarios***

At the 2003 Reno workshop, tribal representatives indicated that there could be no "one size fits all" tribal exposure model. However, it was noted that while no one model will fit all tribes, tribes should focus on developing a general "tribal" model developed on common tribal values and concerns, which can then be adapted and applied to tribal communities. (2003 Reno, pg. 13)

In general, workshop participants were supportive of current efforts underway by EPA to incorporate tribal exposure scenarios into risk assessment models. The efforts discussed included OPPTS' Tribal LifeLine Project, which focuses on development of probabilistic modeling software that focuses on incorporating tribal exposure scenarios and lifestyles into a model measuring aggregate and cumulative pesticide exposures, allowing tribes to input the kinds of parameters that they feel are reasonable and reflective of their lifestyles (2005 Reno, pg. 20) and TASWER's Native American exposure and risk assessment model, which will serve as a training tool for tribes allowing them to incorporate more tribally relevant exposure pathways when examining exposures to chemicals from hazardous waste sites. (2005 Reno, pg. 21)

A tribal representative indicated that developing tribally specific models does not necessarily require the development of individual models for each tribe in Indian Country and suggested that the development of EcoRegion-based models, such as those currently being developed by Barbara Harper under an EPA ORD Science to Achieve Results (STAR) grant represent a potential improvement to current "tribal" risk models. Barbara Harper is involved in developing EcoRegion-based scenarios that reflect unique regional resource bases. While specific usage patterns and usage rates could differ among tribes in a region, the regional-based scenarios could be adjusted for site-specific issues and represent a better baseline than existing suburban population default models. (2005 Reno, pg. 17) The EcoRegion-based models are not tribal- or site-specific, but could provide a better starting point for predicting risk than is currently supplied by national-level, suburban-based risk models. (2005 Reno, pg. 22)

Another factor to be considered when developing tribal exposure scenarios, as noted by a tribal representative during the 2005 Reno workshop, is that a number of tribes are currently working to restore their natural resources and ensure more sustainable resource use. In doing so, many tribes intend to not only continue but to increase their use of natural resources and traditional food sources. Therefore, when developing tribal exposure scenarios, modelers need to recognize and account for increased resource usage. (2005 Reno, pg. 21) As discussed during the workshop, a need exists for exposure scenarios to account for historical consumption rates and patterns that would allow tribes to sustain tribal traditional health and cultural practices (2005 Reno, pg. 18), and efforts are underway to describe traditional use and traditional (cultural) lifeways patterns for use in risk assessment, with the aim of restoring and protecting tribal resources and lifestyles. Rather than developing fish consumption surveys to identify current suppressed resource use and consumption levels, some researchers are looking at current subsistence and treaty information (as well as anthropological, environmental archeological, and historical information) to identify traditional (cultural) consumption patterns to serve as a good measure for resource restoration goals and accommodate for the resurgence of interest by tribes in traditional foods. (2005 Reno, pg. 22)

In addition, as tribes are trying to return to a more traditional diet, they are looking for ways to compare the risks posed by consuming traditional versus non-traditional food items. (2005 Reno, pg. 25) Though this needs to be balanced with the potential impacts of implementing dietary advisories if health impacts are determined, sensitivities are needed in weighing the potential health risks posed by contaminants and the potential health and cultural impacts that could result from the implementation of dietary advisories on traditional foods.

#### ***Incorporate Qualitative versus Quantitative Tribal Impacts***

During the workshops, participants discussed the need for both quantifiable and non-quantifiable impacts (e.g., loss of ceremony and culture of a tribe when contaminated river water—and/or the perception of this contamination—impacts a tribe's ability to participate in sweat lodges) be included in risk assessment processes. At the 2003 Albuquerque workshop, a tribal representative indicated that current risk assessment policies and procedures tend to ignore the impact of potential activities on tribal culture, such as the impacts of potential action on a tribe's origin or creation story, landscapes, historical stories, songs, dances, prayers, language, etc. She noted that while these impacts may not be easily quantifiable, they are vitally important to the continued health and well-being of tribal communities and the protection of treaty-reserved homelands. (2003 Albuquerque, pg. 6) At the 2005 Reno workshop, a tribal representative recommended that not only should quantifiable and non-quantifiable impacts be included, but they should be given equal weight in the risk assessment process. (2005 Reno, pg. 9) Additional discussion is needed to determine how best to incorporate qualitative impacts into the risk assessment process. As was noted by a tribal representative at the 2005 workshop in Reno, NV, the current scientific standards used by EPA require quantifiable threshold exposure levels to determine risk and questions

exist over whether and how tribal practices (e.g., access to ceremonial areas) can be monitored appropriately. (2005 Reno, pg. 9)

## **Section II: Developing a New Paradigm**

Although the TSC recognizes the need to improve the current risk assessment process to better incorporate tribal perspectives, there has also been a significant amount of feedback collected from tribes about more long-term alternatives to the current risk assessment paradigm for environmental decision making. The sections that follow highlight the feedback that was received from tribal representatives during the three workshops convened by the TSC regarding what this new paradigm should entail. The issues are presented in no particular order.

### **Incorporate a Health-based Focus**

During the 2005 Reno workshop, several participants asked for a more health-driven process, one that avoids looking at maximum risk and exposure levels. They observed that the current risk assessment paradigm focuses solely on hazard and risk assessment. A participant indicated that a safety/health-driven process is particularly crucial in relation to Reservation lands, as tribes and tribal lifeways are tied to tribal lands, and, therefore, precaution and protection are crucial elements. (2005 Reno, pg. 8)

### **Focus on Risk Prevention**

During the 2005 Reno workshop, several participants indicated that a new paradigm should focus on risk prevention rather than on cleanup after contamination has occurred. The paradigm should focus on protecting the next seven generations and beyond, geared toward protection of human health and the environment in perpetuity. (2005 Reno, pg. 8)

### **Incorporate Cumulative Impacts**

At the 2003 Albuquerque workshop, a tribal representative recommended that a future paradigm incorporate cumulative impacts. He suggested that the focus of current risk assessment policies and procedures be broadened to include more than just a single contaminant, noting that health effects from background levels of multiple chemicals, which exist in the environment in quantities that are right at the contaminant limit, while lawful, may pose considerable health risk and need to be addressed. (2003 Albuquerque, pg. 14)

### **Create a Holistic Paradigm—One that Incorporates Impacts to Community Health, Culture, Lifeways, Well-being and the Environment**

At the 2003 Albuquerque workshop, a tribal representative indicated that EPA and tribal communities are often at odds in terms of risk assessment science because of the language used by EPA in the discussion of risk assessment issues. He indicated that the EPA risk assessment paradigm discusses human health as the most important factor in the risk assessment process, and this contrasts with tribal traditions which view humans as the “younger brother” in a holistic worldview. He observed that this difference in view creates friction in Indian Country. (2003 Albuquerque, pg 4)

During the 2003 Albuquerque workshop, tribal representatives agreed that the current risk model being utilized by EPA is too narrow in scope and needs to be broadened to incorporate a more holistic view of tribal community health and well-being, one that incorporated impacts to

community health, culture, lifeways and well-being as well as the environment. During the workshop, one representative described the concept of risk, as perceived by the Shoshone-Bannock people. She indicated that, when compared to the traditional Western view of risk, which can be defined as the “chance of injury, damage or loss,” the Shoshone-Bannock concept of risk is viewed in terms of healthiness and the interdependency of all living things. This concept is closely tied to the physical, mental, and spiritual well-being of all components of the universe and must, for example, include an evaluation of the role of risk in the social, linguistic, ecological, cultural, and traditional values of the tribes. (2003 Albuquerque, pg. 15)

During another presentation at the workshop, a tribal representative provided an explanation of the worldview of Alaska Native communities, observing that this worldview is wholly different from other communities because Native Alaskan communities have been raised to see the world (and, subsequently, the environmental and health issues that they face) “through a different set of eyes.” She described the holistic nature of this worldview as encompassing physical, emotional, spiritual, and mental components and described the accompanying value system upon which the worldview was based. She stated that this worldview is a critical part of the native communities’ health and well-being paradigm. (2003 Albuquerque, pg. 8)

During another presentation at the workshop, two other representatives indicated that in the tribal worldview, healthy people and a healthy ecosystem are inseparable. They indicated that if aspects of traditional lifeways and risks to the cultural ecosystem are included within the risk assessment framework, risk assessments will also have a public health appearance, where “health” is understood to be comprised of an individual’s and community’s well-being with their lives fully integrated into a healthy ecosystem. (2003 Albuquerque, pg. 15)

### **Include Health and Wellness Indicators**

Throughout the various workshops, there was discussion over the development and use of health and wellness indicators and the need to incorporate these into decision-making processes. During the 2003 Reno workshop, it was noted that any model developed should be able to measure values common to all indigenous communities, taking into account for things such as self esteem, pride, cultural knowledge, and tribal heritage. It was noted that tribal communities understand the linkages between the environment and people and would be able to use a model developed on tribal understanding as a starting point to communicate ideas and evaluate cultural and social aspects of an issue and communicate these issues to outside groups. (2003 Reno, pg 13) During the 2005 Reno workshop, a tribal representative indicated that the fields of community- and public-health provided a good basis for examining the big picture of health impacts, both on the level of individual human health and community-wide health impacts, and observed that a number of cultural, social, health, and welfare indicators that are currently used in the public health arena and in social impact assessments can have direct applicability for tribal risk assessment. (2005 Reno, pgs. 22 & 25)

During the 2003 Albuquerque workshop, a tribal representative indicated that tribal communities are looking into ways to establish “life indicators” to measure the true health and well-being of their communities. He described a model being developed by the Assembly of First Nations called the Community Life Indicators Wheel, which can be used to identify

particular life indicators that are representative of an individual community. (A detailed description of the Community Life Indicators Wheel and The Assembly of First Nations Community Health Indicators project can be found in "Mohawk Council of Akwesasne, Community Health Indicators, Changes in These Indicators and the Analysis of Risk to Social Structures and Cultural Practices.") (2003 Albuquerque, pg. 11)

During the 2003 Reno workshop, tribal participants identified a number of potential cultural and community health indicators that could be used to help measure the health and well-being of tribal communities. These indicators included:

- **Cultural Indicators**, including: (1) gathering activities (e.g., funerals, spiritual and seasonal gatherings, marriages, coming of age ceremonies, pow wows, dances, pilgrimages, hunting and gathering practices, and leadership activities; (2) ceremonies (e.g., sweat lodges, births, doctoring/healing, dances, clan ceremonies, blessings, and purifications; and (3) cultural activities (e.g., language, songs & art, basket making, growing traditional crops, gathering traditional medicines, attendance at classes teaching cultural traditions, level of understanding/use of natural resources by tribal people, and changes in cultural/subsistence practices).
- **Health Indicators**, including: (1) negative indicators (e.g., suicide, substance abuse, mortality/birth rates, cancer rates, mental health statistics, addictive behaviors, human lead and mercury levels, and disease statistics) and (2) positive indicators (e.g., decreases in disease, family integrity, and nutrition).
- **Community Indicators**, including: incarceration rates, visits to drug court and tribal courts, number of individuals involved in foster programs, vandalism, gangs/drug dealers/methamphetamine labs, domestic violence, family (the perception/definition of who family is by tribal peoples, how well the community is reflected in the extended family, where people live, are family members living close to each other and maintaining a sense of family, is the community family oriented), elder center, education rates, participation in youth club activities, day care, availability of emergency and disaster preparedness services, communication.
- **Natural Resource Indicators**, including: tracking of historical land uses; programs and projects being implemented by tribal communities to restore, rehabilitate, and enhance their local environments; measurement of appreciation/media coverage of such activities by outside entities was recommended as a potential indicator measurement; reintroduction of native species; presence of a fisheries department; the number and type of fish being caught by community members; quantification of wetland restoration activities; availability of natural resources to continue traditional practices (i.e., sweet grass, clays, paints, and berries) and whether these resources are being impacted by contamination; roadside spraying and its impact on the ability of tribal communities to continue traditional practices; measurement of the stability of the acreage where traditional activities are practiced; the number of people utilizing walking trails, tribal cultural sites, and other natural resources; whether tribal practices are being

impacted by outside groups competing for the same resources or through destruction of habitat through other purposes; and the availability of water – both in respect to water quality and quantity. (2003 Reno, pg 14-16)

### **Use a Cross-Media Approach**

During the 2005 Reno workshop, several tribal participants indicated that the new paradigm should not be “Program-specific,” i.e., should not be focused on a particular media, such as water, soil, or air, but rather should involve a cross-media approach. (2005 Reno, pg. 8) At the 2003 Albuquerque workshop, several tribal representatives indicated that the current EPA methodology for CERCLA and media Acts (CAA, SDWA, CWA) are geared toward single media, single contaminants, and single pathways, rather than being cumulative. They suggested that if CERCLA were more like NEPA and comparative risk, and if human health risk assessments were combined with ecological (or eco-cultural) risk assessments, then a cumulative method that reflects tribal perspectives and traditional lifeways could be achieved. They observed that the CERCLA statute does not prevent this; it simply has not been done before. (2003 Albuquerque, pg. 15)

### **Reflect the Precautionary Principle**

During the 2005 Reno workshop, a number of individuals suggested that the precautionary principle be considered as a basis for possible alternative approaches to the current risk assessment paradigm for protecting human health and the environment. It was noted that a number of nations, states, and municipalities are already moving to adopt the precautionary principle. However, a tribal representative, who serves on the Tribal Pesticide Program Council, cautioned that an approach based on the precautionary principle might not be universally applicable. She noted that, in the case of pesticide registration, risks posed by pesticides are often not fully understood until the pesticide has been released into the environment, at which point environmental contamination has already occurred. (2005 Reno, pg. 8)

### **Recognize that for Some Tribes, a “Zero Contamination Policy” Exists**

During the 2005 Reno workshop, a tribal participant noted that an inherent concern in discussing risk standards and setting exposure levels, remains that many tribal members are insistent that there is no allowable contamination level other than “zero” contamination; their philosophy and beliefs will not allow them to agree to any level of “acceptable” contamination. The participant noted that this creates problems, particularly given EPA’s current risk assessment approach, and, as a result, can stall cleanup efforts. (2005 Reno, pg. 8)

### **Work with Tribes on a Government-to-Government Basis**

Tribal participants indicated that it is imperative that EPA work with tribes on a government-to-government basis when considering changes to EPA’s risk assessment policies and procedures. During the 2003 Albuquerque workshop, a TSC tribal representative expressed concerns that tribes had not been fully consulted during the development of EPA’s cumulative risk assessment framework, noting that the Federal government has a mandate to consult with tribes on a government-to-government basis on issues that ultimately affect Tribes. (2003 Albuquerque, pg. 4) During the 2005 Reno workshop, a number of tribal participants asked that EPA enter into government-to-government consultation with their individual tribes to develop

recommendations for improving EPA's risk assessment policies and procedures. A recommendation was made that EPA send representatives out to all tribes in Indian Country to explain the issues...and answer questions raised by tribes. (2005 Reno, pg. 13)

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**Grant, Carol J. Dell (CDC/OD/OADPG)**

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**From:** Seneca, Dean (ATSDR/DHAC/EISAB)  
**Sent:** Wednesday, May 24, 2006 11:53 AM  
**To:** 'Native Research Network list'; 'Network in Support of Native Students in Six Nations Territories'  
**Cc:** 'Hemmett.Roland@epamail.epa.gov'  
**Subject:** FW: Update on EPA Tribal Research Program-- 2006 RFA Development  
**Attachments:** Cover Letter.doc; Call for Papers.doc; Subtopics.doc; Submission Form for Presentations.doc; Science Priorities Document.pdf; TTL Tribal Issues Paper.pdf

FYI

Dean S.

Dean S. Seneca, MPH, MCURP  
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-----Original Message-----

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**Sent:** Wednesday, May 24, 2006 8:11 AM  
**To:** Seneca, Dean (ATSDR/OA/OD)  
**Cc:** [Rodia.Monica@epamail.epa.gov](mailto:Rodia.Monica@epamail.epa.gov)  
**Subject:** RE: Update on EPA Tribal Research Program-- 2006 RFA Development

Dean, I would like to introduce myself to you. As you can see below I am the science advisor in EPA Region 2. More importantly I am the co-chair of the EPA's Tribal Science Council. My co-chair is Dave Nelson from the Cheyenne River Sioux Tribe. The TSC is having a science conference ( National Forum on Tribal Environmental Science) during the week of September 24th at the Quinault Nation in Oceans Shores, Washington. I have attached the call for papers and related documents for you. We are looking for a broad distribution of the call for papers and any way you could help would be appreciated. If you are interested in participating in the conference please contact me as we are interested in attracting other federal agencies.

(See attached file: Cover Letter.doc)(See attached file: Call for Papers.doc) (See attached file: Subtopics.doc) (See attached file: Submission Form for Presentations.doc)

I have also attached two documents that the TSC has recently produced (Tribal Science Priorities and Tribal Risk Assessment Issues).

(See attached file: Science Priorities Document.pdf)(See attached file: TTL Tribal Issues Paper.pdf)

The TSC is interested in reaching out to other federal agencies to see what issues they are working on and if we can combine forces. We would certainly be interested in talking with you. If you are interested please contact me at 732-321-6754.

Rollie

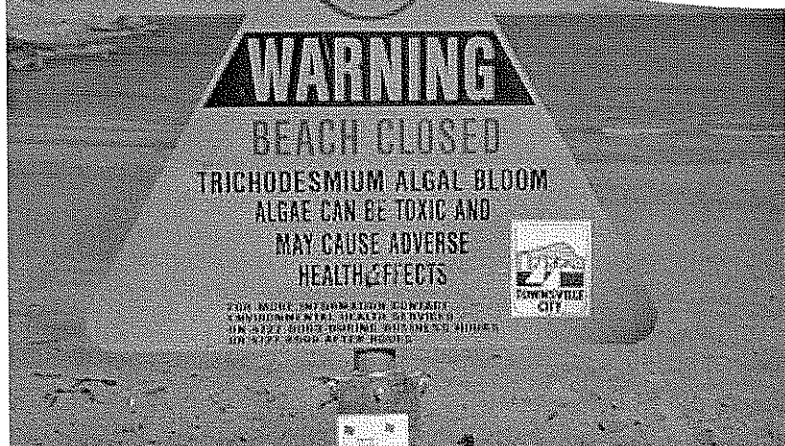
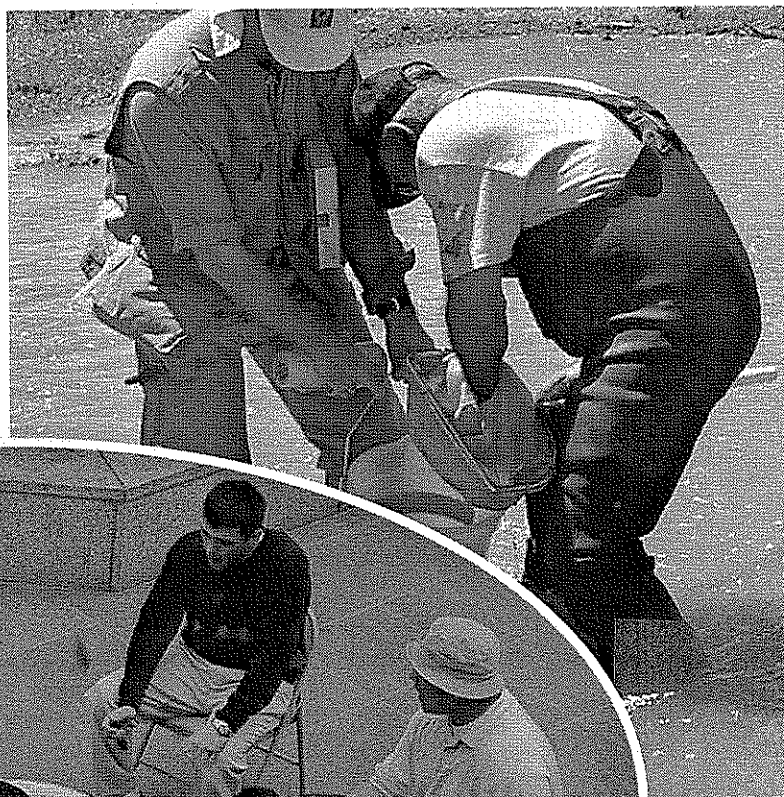
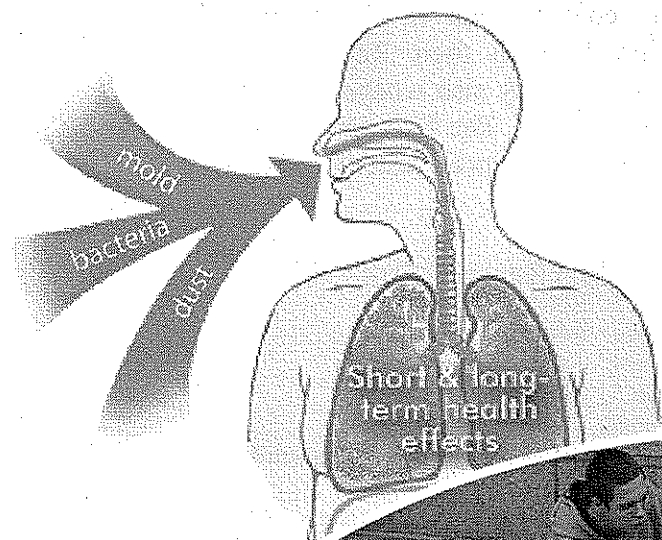
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United States  
Environmental Protection  
Agency

# National Tribal Science Priorities

April 2006



Developed by the National  
EPA-Tribal Science Council

## ACKNOWLEDGMENTS

The National EPA-Tribal Science Council (TSC) wants to acknowledge all the tribal and EPA representatives on the workgroup for their contributions in developing the document. The tribal representatives worked diligently with their Regional Tribal Operations Committee to identify priority science issues. They also worked together to develop national priority issues in common for Indian Country. The EPA representatives identified possible efforts to address the issues. The TSC representatives who were involved in developing the document are:

### Current Tribal Representatives:

Dan Kusnierz, Penobscot Nation  
Linda Logan, Tonawanda Seneca Nation  
Michael Bolt, Eastern Band of Cherokee Indians  
Troy Pierce, Poarch Band of Creek Indians  
Christine Berini, Fond du Lac Band of Lake Superior Chippewa  
Curtis Munoz, Kiowa Tribe  
Denise West, Winnebago Tribe of Nebraska  
Richard Janssen, Confederated Salish and Kootenai Tribes  
Vickie Kujawa, Flandreau Santee Sioux Tribe  
Marshall Cheung, 29 Palms Band of Mission Indians  
Dave Nelson, Cheyenne River Sioux Tribe

### Former Tribal Representatives:

James Ransom, Saint Regis Mohawk Tribe  
Brenda LaFrance, Mohawk Nation of Akwesasne  
Bernadette Hudnell, Mississippi Band of Choctaw Indians  
Steve Terry, Miccosukee Tribe of Florida  
John Persell, Minnesota Chippewa Tribe  
Kendal Coats, Muscogee (Creek) Nation  
Gina Kneib, Sac & Fox Nation of Missouri  
Fran King-Brown, Southern Ute Indian Tribe  
Kesner Flores Jr., Cortina Indian Rancheria  
Clay Bravo, Hualapai Tribe  
Cisney Havatone, Hualapai Tribe  
Chris Gannon, Confederated Tribes of Warm Springs  
Shawna Larson, Chickaloon Village

### Current EPA Representatives:

Region 1 Robert Hillger  
Region 2 Roland Hemmett  
Region 4 Thomas Baugh  
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Region 6 Michael Callahan  
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Region 8 Patti Tyler  
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Region 10 Dana Davoli  
AIEO Ella Mulford  
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OPPTS Elizabeth Resek  
ORD Thomas Barnwell  
OSWER David Charters  
OW Rita Schoeny

### Former EPA Representatives:

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Region 2 Barbara Finazzo  
Region 5 Robert Springer  
Region 6 Norman Dyer  
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OW Arnie Kuzmac  
ORD Harold Zenick

Also, the National EPA-Tribal Science Council wants to thank Claudia Walters who served as the Executive Secretary for the National EPA-Tribal Science Council since its formation. The TSC also wants to thank Pat Tallarico and Karen Santora from SRA International, Inc. for their support in developing the document.

# Table of Contents

<b>ACKNOWLEDGMENTS.....</b>	<b>2</b>
<b>I. Background.....</b>	<b>4</b>
<b>II. Development of the National Tribal Science Priorities .....</b>	<b>5</b>
<i>Initial Tribal Science Priorities Identified—September 2002 .....</i>	<i>5</i>
<i>Tribal Science Priorities Reassessed—November 2004 .....</i>	<i>5</i>
<i>Tribal Science Priorities Refined—May 2005 .....</i>	<i>6</i>
<b>III. Considerations for each National Tribal Science Priorities.....</b>	<b>7</b>
<i>Tribal Traditional Lifeways—An Overarching Issue .....</i>	<i>7</i>
<i>Improve the Agency's Environmental Decision-Making Processes .....</i>	<i>8</i>
<i>Cross-Priority Activities .....</i>	<i>9</i>
<b>IV. Current National Tribal Science Priorities.....</b>	<b>10</b>
<i>Habitat Loss .....</i>	<i>10</i>
<i>Contaminated Precipitation.....</i>	<i>13</i>
<i>Biological Stressors (e.g., algal blooms, cyanobacteria) .....</i>	<i>15</i>
<i>Environmental Triggers for Respiratory Distress .....</i>	<i>16</i>
<i>Pharmaceuticals in Waste Water (including personal care products and antibiotics in livestock products) .....</i>	<i>18</i>
<i>Dioxin and Dioxin-like Compounds.....</i>	<i>20</i>
<i>Persistent Bioaccumulative Toxics Source Reduction.....</i>	<i>21</i>
<i>Endocrine Disruptor Chemicals.....</i>	<i>22</i>

## **I. Background**

The National EPA-Tribal Science Council (TSC) was formed in 2001 to provide a forum for tribes and EPA to work collaboratively to identify and address national environmental science issues of importance to both tribes and EPA. Composed of tribal representatives from each EPA Region and Alaska and EPA representatives from each EPA Program and Regional Office, the Council is organized to ensure a national, cross-program perspective and approach. The tribal TSC representatives are selected by the respective Regional Tribal Operations (ROTC) to serve as a liaison between the ROTC and TSC.

The document is organized to provide a context and description of the science priorities identified by the tribal TSC representatives. Section II describe how the tribal science priorities have evolved and changed since they were first proposed in 2002. Section III describes the relationship between tribal traditional lifeways, other processes, and the science priorities. Section IV discusses the current priorities in detail.

## **II. Development of the National Tribal Science Priorities**

The primary purpose of the TSC has been to collaborate with the Regional Tribal Operations Committees/Regional Operations Committees on tribal science priorities. The TSC tribal representatives work with the tribes in their Region to gather their science priorities. The TSC tribal representatives work together to identify those that are national in scope and those priorities that are Regional in nature are addressed through the TSC Regional representatives. In identifying these priorities, tribes seek to: (1) understand what ongoing activities are occurring at EPA to address these issues and where this information resides within EPA, (2) assess how tribes could contribute to advancing the science surrounding these issues, and (3) identify what tribes could do to help get these issues included into the Agency's budget priorities. This process for identifying and discussing tribal science priorities helps ensure that the TSC's activities are always tribally driven, a core part of the TSC's mission. The priorities that are national in scope are discussed with the TSC Agency representatives to determine appropriate actions.

### ***Initial Tribal Science Priorities Identified—September 2002***

The first set of national tribal science priorities was identified by the TSC tribal representatives in September 2002. The priorities were compiled by the representatives from input they had received from tribes in their respective Regions. Upon examining the various lists of Regional tribal science priorities, the tribal representatives selected only priorities that were national in scope and then organized and categorized these priorities for presentation to their Agency counterparts. The initial tribal science priorities identified included:

- Tribal Traditional Lifeways (including tribally relevant risk assessment and a new concept for environmental decision making),
- Endocrine Disruptor Chemicals (EDCs),
- Dioxin Reassessment and Reference Dose,
- Cumulative Impacts,
- Toxic Mold,
- Pharmaceuticals in Wastewater, and
- Tribal Research (including global warming and climate change monitoring).

### ***Tribal Science Priorities Reassessed—November 2004***

Between 2002 and 2004, the TSC held workshops, encouraged research efforts, and developed tools to share information on these topics. As a result of these activities and input from tribal representatives about new or changing science priorities in Indian country, the Council reassessed the original priorities at their meeting in Carlton, MN, in November 2004. Most notably, the tribal representatives decided to reframe each science priority in terms of its overarching relationship to and impact on tribal traditional lifeways. Originally, tribal traditional lifeways had been a discrete priority in relation to the TSC's efforts regarding risk assessment and development of a new environmental decision-making concept based around health and well-being. However, through the TSC's discussions, it became apparent that the aspect of each science priority that made it particularly relevant to tribes was its impact on tribal traditional lifeways.

In addition, the TSC chose to revise some of its initial science priorities and add a few new priorities. The TSC identified both "Habitat Loss" and "Biological Stressors (e.g., algal blooms and cyanobacteria)" as new priorities. The Council also changed the title of the "Dioxin Reassessment and Reference Dose" issue to "Dioxin and Dioxin-like Compounds" to reflect the broader issue of concern. Additionally, the TSC changed the "Tribal Research (Including Global Warming and Climate Change Monitoring)" issue so that tribal research was included as an activity under each of the other tribal priorities. Global warming and climate change were incorporated into a new topic, "Habitat Loss." Finally, the TSC decided to replace the "Toxic Mold" issue with the broader topic of "Environmental Triggers for Respiratory Distress." The Council determined that toxic mold was of concern largely because of the respiratory problems it contributes to, and felt that the issue should be broadened to include other triggers as well.

In addition, the TSC decided at the Carlton, MN meeting that each tribal science priority identified should be considered in relation to a series of cross-priority activities, including risk (i.e., exposure and impact), education, research, environmental justice, and restoration.

#### ***Tribal Science Priorities Refined—May 2005***

At the TSC meeting held in Denver, CO, in May 2005, the Council worked to refine and clarify the national tribal science priorities. Specifically, the tribal representatives worked to (1) fully define the science priorities as they relate to Indian country, and (2) provide specific examples of how each issue impacts Indian country. In a separate discussion, Agency representatives provided additional information on (1) the Agency's proposed actions and products to address each science priority issue and (2) the description of the Agency's activities to date for each issue. The refined listing of science priorities resulting from this discussion and a diagram of their relationships can be found in Section III.

### III. Considerations for each National Tribal Science Priority

The TSC tribal representatives identified three sets of considerations for each of the national tribal science priorities:

- Tribal traditional lifeways
- Environmental decision-making processes
- Cross-priority activities

#### *Tribal Traditional Lifeways—An Overarching Issue*

Tribal traditional lifeways<sup>1</sup> encompass the unique cultural, spiritual, economic, and language practices pursued by tribal communities. While EPA's mission is to protect human health and the environment, tribes have expressed concerns that many environmental criteria and standards are not adequately protective of tribal community health or natural resources, given the unique relationship that many tribes have with the environment and the unique role that the environment plays in the continuation of their cultural, spiritual and dietary practices.

When tribal lands are degraded, the impact to tribal traditional lifeways can be considerable. Tribal resources can decline, disappear, or become contaminated, and as a result, tribes may be unable to practice their traditional ways of life as before—with detrimental impacts to the cultural, spiritual, economic, and health of tribal communities. When tribal resources become unavailable, language, income, and/or cultural (e.g., hunting, gathering, harvesting, basket making, sweat lodge, etc.) practices surrounding these resources can be lost. When resources such as traditional foods (e.g., fish, sea mammals, beavers, moose, deer, and wild rice) are lost to tribal communities, direct health impacts may result (e.g., increased rates of cardiovascular and diabetes) as alternative foods replace traditional diet. In addition, the tribe's history and cultural practices that revolve around these aspects of the environment may come to an end.

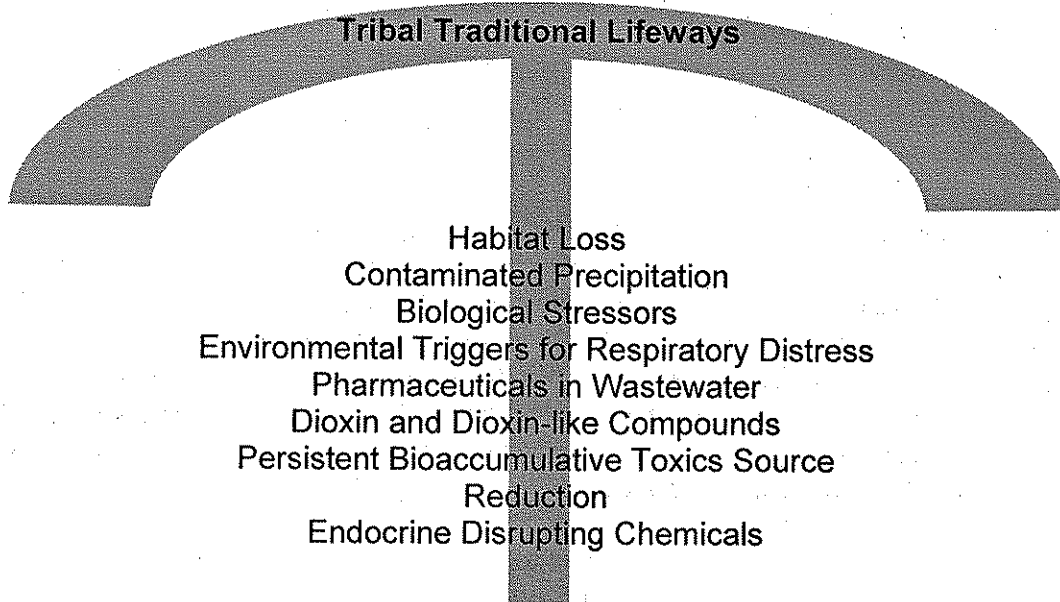
As a result, TSC tribal representatives have identified traditional tribal lifeways as the overarching issue under which all of the tribal science priorities fall. The importance of each science priority is directly related to the way in which the issue impacts not only tribal health and the environment, but also the way in which it directly impacts the ability of tribal communities to pursue their traditional tribal ways of life—with direct implications for cultural, spiritual, economic, and language practices of tribal communities.

The diagram below shows the importance of tribal traditional lifeways and the relationship to the national tribal science priorities. Tribal traditional lifeways acts as an umbrella to the science priorities. Each science priority, for instance, habitat loss would

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<sup>1</sup> The term "tribal traditional lifeways" was identified by TSC tribal representatives as the preferred way to describe the unique cultural, spiritual, economic and other practices that connect tribes to their environment, their past and their future. It was meant to replace the term "subsistence" that was commonly used to describe these things but was considered to have negative connotations.

come under the umbrella and be viewed from the tribes' traditional ways and relationship with the environment and others – their ability to continue life - their own and future generations. Therefore, tribal traditional lifeways would be considered in conjunction with each of the science priorities.



### ***Improve the Agency's Environmental Decision-Making Processes***

Tribes assert that EPA's current risk assessment policies and procedures for environmental decision-making are not protective of tribal resources and lifeways.

#### **Improve Environmental Decision-making Processes:**

- Current Risk Assessment paradigm
- Create a new environmental decision-making process

The processes fail to adequately account for or include a holistic approach for assessing the social, cultural, and spiritual values, beliefs, and practices that link tribal people to their environment. Since current risk scenarios and risk factors are geared toward urban settings in the United States, they may not consider subsistence lifestyles. Therefore, tribes who practice traditional lifeways outside the "mainstream" are less protected, since they are subject to exposure levels higher than those included in typical exposure factors. In addition, the risk management solutions identified from the current risk assessment methodologies often force tribal populations to alter activities that are core to their existence, such as those constraints imposed by the creation and adoption of fishing and hunting advisories.

The TSC has identified environmental decision-making processes as an area for improvement. The TSC recognizes that EPA currently utilizes the risk assessment paradigm as the basis for environmental decision-making and seeks to improve the policies and practices to incorporate tribal traditional lifeways. In addition, the TSC recognizes that the fundamental assumptions and approach of EPA's risk assessment paradigm can not fully address tribal issues and perspectives and seeks a longer-term goal

of developing a new environmental decision-making paradigm for EPA consideration – one focusing on human and ecological health well-being.

### ***Cross-Priority Activities***

As noted previously, the TSC identified a number of activities to be considered for each of the national tribal science priorities. Each activity identified is listed below along with a brief description of its relevance to the science priorities.

#### **Cross Priority Activities:**

- Exposure and Impact
- Education
- Research
- Environmental Justice
- Restoration

- ***Exposure and Impact*** – One of the primary factors that drove its listing was the concern that tribes had about exposure to environmental contaminants or changes and the impact of these exposures to tribal populations. Tribes are interested in better understanding and protecting against harmful impacts and outcomes to the health of tribal communities and the environment.
- ***Education*** – In many cases, the science priorities identified are of concern to tribes at least in part because tribes feel there is not enough information about the issue and how it specifically relates to tribes. Although EPA may have a number of resources available on these topics, more effort needs to be made to get this information out to Indian country so that tribes have a more complete picture of the issue and its potential impacts.
- ***Research*** – For a number of cutting-edge science priority issues, including “Pharmaceuticals in Wastewater” and “Endocrine Disrupting Chemicals,” tribes are especially interested in learning more about the Agency’s current research efforts and to learn of avenues to increase tribal participation in these research efforts. In many cases more research may be needed to better understand how these issues are impacting tribal populations.
- ***Environmental Justice*** – With respect to each science priority, tribes wish to recognize and to protect against disproportionate impacts to tribal communities by environmental hazards. Tribes assert that, given that tribal lifeways are uniquely tied to tribal lands, they are often disproportionately impacted by environmental hazards.
- ***Restoration*** – Once issues are fully understood, steps need to be taken to restore the environment and tribal traditional lifeways. These steps should be appropriate, taking into account tribes’ unique legal and cultural status.

## IV. Current National Tribal Science Priorities

This section describes each of the current national tribal science priorities and provides examples of why these priorities are of concern in Indian country as well as information on what EPA has done or is doing in response to these priorities.

### ***Habitat Loss***

#### Description

Habitat loss occurs when an ecosystem experiences a change in its structural makeup (either flora and/or fauna) due to an outside influence. Habitat loss can be particularly detrimental to tribal communities pursuing traditional lifeways because many tribes depend on specific species of plants or animals or land areas to support their cultural practices. Without these specific resources, they are not able to continue these practices. Substituting other resources is often not an option or can have other detrimental environmental or health impacts.

Habitat loss can occur in a variety of ways, including reservoir and dam management and mining impacts, which are of particular concern to tribes.

Specific concerns related to reservoir and dam management include: (1) the impact to habitat by sediment loading through the controlled raising and lowering of river and reservoir levels and the impact of the potential influx of contaminants that are brought in with the sediments; (2) the impact of water fluctuation and water loss on tribal communities living along waterways [e.g., lack of drinking water, impacts to fish and waterfowl, impacts to traditional gathering practices (e.g., for medicinal plants, basket making materials, etc.), impacts to traditional activities (e.g., such as dances that are held in areas along the river)]; (3) the impact of management practices on groundwater recharge and its impact on tribal water supplies; and finally (4) the impact of the

#### **Examples Where Tribal Impacts from Reservoir and Dam Management are Felt**

- The Penobscot Nation Reservation waters currently support extremely diminished runs of salmon ( $\approx 2\%$  of historical runs) and eels, and populations of alewives, shad, and sturgeon are nearly absent. The low population levels are due to cumulative fish passage and habitat impacts of multiple dams and other historical upstream production that has impacted habitat for these species.
- Water diversion in the Klamath River is affecting the local salmon population on which the Klamath Tribe depends.
- Water transfer on the San Francisco Bay Delta is impacting a number of tribes in the area.
- Water diversion on the Salton Sea is impacting a number of tribes bordering the sea and impacting a major Pacific flyway for migratory birds.
- Water diversion on the Colorado Delta, which borders Mexico, is impacting various tribes.
- Channelization of the Missouri River is impacting neighboring tribes. Denise West looked into – TSC needs to decide whether to include. If it is included, additional detail is needed.
- Water quality data collected since 1999 indicates that Deadfish Lake on the Fond du Lac Reservation, a premier producer of wild rice, is seeing higher nutrients and sediment mercury concentrations than other lakes on the reservation. The data suggests that the filling and releasing of water from an impoundment built to control water levels and protect the wild rice from water level fluctuations that negatively affect the rice crop are responsible. However, more research is required to confirm these findings.

lack of any formal or prescribed fish passage facilities at some dams, cumulative upstream and downstream fish passage inefficiencies and losses at dams with formal fish passage facilities, and lost or degraded production habitat and enhanced predatory environments due to associated impoundments.

**Examples Where Tribal Impacts from Mining Issues are Felt**

Interest by a mining company to develop mine lands associated with an Alaska Native Community, where there is concern that mining impacts will harm lake seals---This is one of two areas in the world where lake seals are found.

Specific concerns related to mining impacts include: (1) the impact of radium from mining activities on tribal drinking water sources, and (2) the impact of mining activities on tribal lands and resources.

Although the group recognized that this is a significant and broad issue, the tribal

representatives suggested that the TSC conduct educational and outreach efforts on this topic to enhance the scientific capacity of tribes in the areas of sampling, monitoring, and data assessment and the development of environmental standards to protect species or specific habitats (e.g., water quality standards).

Efforts to Address This Issue:

When the TSC tribal representatives identified this issue in 2004, they worked with their EPA counterparts to assess what activities were being done to address the issue and identify any additional activities that would be helpful.

Efforts already underway on this issue include:

- EPA is developing habitat criteria; there is a framework for guiding and prioritizing habitat research under discussion between Office of Water and Office of Research and Development.
- EPA's Science Advisory Board has begun investigating the potential for EPA to develop methods or processes for Valuing the Protection of Ecological Systems and Services.
- EPA Ecological Benefits Assessment Strategic Plan (EBASP). The plan is being prepared by a multidisciplinary workgroup of EPA ecologists and economists as part of the Agency's ongoing efforts to improve our ability to value the ecological benefits of EPA policies and actions.
- NatureServe is developing criteria for healthy habitats. This group collects and checks many sorts of environment data.
- The Las Vegas lab for terrestrial habitat does GIS-based spatial analysis, also referred to as landscape ecology. This group could serve as a resource to tribes.

Based on these current activities, the tribal representatives identified additional requests that, if met, could assist tribes in understanding and addressing this issue. In 2005, the TSC met to discuss these requests and respond to them. The requests identified and EPA's actions in response to these requests are included below.

- Conduct research on the extent of habitat loss in Indian country, the causes of habitat loss and methods to regain/restore the habitat. (For example, the TSC could pilot an Environmental Monitoring and Assessment Program/Regional

Environmental Monitoring and Assessment Program (EMAP/REMAP) project in Indian country, and biasing the sampling scheme to focus specifically on Tribal lands. Through this process, tribes can take advantage of funds EPA has allocated to train tribal members to do such work, and can collect desired data as they go through their training. Tribes can also work on developing culturally-relevant indicators and can compare the data from Indian country to the national database. Region 10 has done some of this work with the Nez Perce tribe.)

- EPA OW and ORD are discussing a framework for guiding and prioritizing habitat research. Tom Barnwell and Rita Schoeny will invite a representative from EPA OW and ORD to present the TSC tribal representatives with an overview of what the Agency is doing with respect to habitat loss; this could result in a pilot on tribal lands.
- TSC Member Tom Barnwell (EPA ORD) will contact Bruce Jones to advocate and educate about tribal interest in this topic and will assess EPA ORD's activities in this area.
- TSC Member Rita Schoeny (EPA OW) will provide a discussion document that addresses habitat loss research plans for distribution to the TSC.
- Contact SAB regarding the activities of the subcommittee working on Valuing the Protection of Ecological Systems and Services and contact EPA's workgroup regarding tribal involvement in EPA's Ecological Benefits Assessment Strategic Plan.
  - TSC member Charlotte Bertrand (EPA OEI) will contact EPA's Scientific Advisory Board (SAB) regarding (1) the activities being conducted by the SAB subcommittee working on Valuing the Protection of Ecological Systems and Services, and (2) tribal involvement in EPA's Ecological Benefits Assessment Strategic Plan. The plan is being prepared by a multi-disciplinary workgroup of EPA ecologists and economists as part of EPA's ongoing efforts to improve its ability to value the ecological benefits of EPA policies and procedures.
- Develop a TSC subcommittee for this topic.
  - The TSC will consider creating a TSC subcommittee for this topic pending the results of the above efforts.
- Hold a Tribal science workshop – similar to the national one done for Environmental Justice (EJ) community. This could possibly be combined with another tribal environmental conference.
  - The TSC will consider holding an EPA-sponsored tribal science workshop on habitat loss similar to the national conference for the Environmental Justice community. The TSC will assess interest from the tribal community on this action and consider conducting a workshop as part of a larger workshop on tribal science issues.
- Begin a regional or national speaker series and use video teleconferencing to link tribes, universities or other interested parties.
  - Once information is collected, the TSC will determine the most appropriate avenue for sharing this information with tribes.

Additional ideas that the TSC will consider at future meetings include:

- Coordinating funding sources for this kind of broad work. Possible mechanisms/resources include: Regional Applied Research Effort (RARE), Strategic Environmental Research and Development Plan (SERDP) from Department of Defense; Science to Achieve Results (STAR); National Institute for Environmental Health Services (NIEHS); NatureServe and Water Environment Research Foundation (WERF).

## ***Contaminated Precipitation***

### **Description:**

Power plants, mining operations, and incinerators release heavy metals (e.g., arsenic, lead, copper, mercury, and zinc) and other contaminants (e.g., NO<sub>x</sub> and SO<sub>x</sub>), into the atmosphere. These pollutants combine with water to form contaminated precipitation, which can enter terrestrial systems and impact human health and the environment. Of particular concern is the impact of airborne mercury deposition. In the United States, coal-fired power plants and incinerators are the largest sources of mercury emissions to the air, and mineral mining releases the largest amount of mercury to land. When mercury enters water, biological processes transform it to a highly toxic form that builds up in fish and animals that eat fish. People are exposed to mercury primarily by eating fish, and exposure to excessive levels can permanently or fatally injure the brain and kidneys. Women of child bearing age and young children are at particular risk from mercury health effects.

Tribal communities are particularly concerned with the impacts of airborne mercury deposition, as tribes that practice subsistence fishing and consume larger amounts of fish are at greater risk of direct health effects from consuming mercury-contaminated fish. In addition, for tribes that have traditionally depended on subsistence fishing and hunting practices, fish and game advisories encouraging tribes to reduce or discontinue consumption rates due to elevated mercury levels can result in severe impacts to tribal income and/or cultural practices.

Generally, tribes are interested in identifying and obtaining additional education and outreach opportunities to train tribes and develop tribal capacity for air monitoring and testing of airborne mercury deposition. Tribes are also interested in developing Regional and national air monitoring programs on tribal lands and would need both training and hardware for developing tracking and monitoring programs within Indian country.

### **Examples Where Tribal Impacts from Contaminated Precipitation are Felt**

- The impact of mercury deposition resonates on a nationally geographic level throughout tribal waters, lands, and resources. Several tribes have reported fish advisories such as: Penobscot (Maine); Cheyenne River Sioux (South Dakota); and Fond du Lac and Grand Portage Bands of Lake Superior Chippewa (Minnesota). Fish advisories prevent tribes' ability to maintain traditional tribal lifeways.
- Acid deposition is a major contributor to tribal water quality degradation. The pH levels are consistently driven below a value of six standard units—which is the tribal water quality standard of the Eastern Band of Cherokee Indians (North Carolina).

#### Efforts to Address This Issue:

Although tribes recognize that this is a pervasive issue and can likely only be solved by significant regulatory action to prevent the release of these pollutants, they identified a number of other requests that may help educate and inform tribal communities about the problems associated with mercury deposition in particular and contaminated precipitation more generally. A summary of these requests and efforts that are being initiated in response to the requests are provided below:

- Encourage alternative energy systems (e.g., wind and solar) and coordinate with pollution prevention staff in EPA Regions to explore other ways to prevent pollutants from entering the atmosphere.
  - TSC Members David LaRoche (EPA OAR) and Robert Hillger (EPA Region 1) will develop a list identifying EPA pollution prevention personnel from each EPA Region as a resource for encouraging alternative energy system implementation (e.g., wind and solar) by tribes.
- The TSC should obtain a copy of the Agency's Mercury research plan.
  - TSC Member Rita Schoeny (EPA OW) will provide a copy of the Mercury Action Plan, the multi-year plan, and the mercury portal link for distribution to the TSC.
- Hold a Tribal science workshop – similar to the national one done for Environmental Justice (EJ) community. This could possibly be combined with another tribal environmental conference.
  - The TSC will consider hosting an EPA-sponsored tribal science workshop on contaminated precipitation issues similar to the national conference for the Environmental Justice community.
- Begin a regional or national speaker series – use video teleconferencing like Region 1 does and potentially link up with Universities to involve Tribes.
  - Once information is collected, the TSC will determine the most appropriate avenue for sharing this information with tribes.

Other requests or recommendations that will be considered by the TSC at future meetings include:

- Encourage tribes to access money for risk assessment similar to what states are doing with respect to community level assessment guidance update (i.e. ATRA library Vol. 3) and community-based air toxics projects.
- Take advantage of money for community-based (not volunteer) programs.
- Get more tribal expertise and reps on the TSC from this and other science areas less focused on water.
- Consider holding a product expo (e.g., green building materials and alternative energy systems).
- Review EPA OAR's strategic plan, goals, and programs to identify potential opportunities for collaboration.
- Consider ways to encourage tribes to use funds available under Section 305(b) of the Clean Water Act to set up air monitors for mercury in air.

## ***Biological Stressors (e.g., algal blooms, cyanobacteria)***

### Description:

Biological stressors on water bodies can have a variety of impacts. Nutrient inputs generate bloom conditions of marine and freshwater phytoplankton and periphyton and can cause shifts in community composition to potentially toxic species. Algal blooms can result in fish kills, impact wading birds, and cause beach closures. For tribes who depend on impacted water bodies for fishing, bathing, drinking water and other uses, these stressors can have a significant impact on their lifeways.

### Efforts to Address This Issue:

Although EPA is developing nutrient criteria, and the Office of Water (OW) provides grants to help develop them, nothing is being done specifically regarding the impact of biological stressors on tribes. As a result, the TSC identified a number of potential efforts that may be able to help address the issue and its impact to tribal traditional lifeways. A summary of these requests is provided below. Unfortunately, the TSC has not yet explored these requests fully, so no specific responses have been developed to date.

#### **Examples Where Tribal Impacts are Felt from Algal Blooms**

- Algal blooms caused by polluted lake waters impact the Miccosukee and Seminole Tribes in Florida. The Seminole Tribe has a reservation on the northern boundary of Lake Okeechobee. They draw water from the lake for irrigation purposes, and pollution from Lake Okeechobee can violate the tribe's water quality standards. The algal blooms also can impact the tribes through fish kills and impacts to wading birds.
- Algal blooms along the Salton Sea and in the Great Lakes cause fish die offs and beach closings that can impact neighboring tribes.
- The Penobscot Nation has been experiencing planktonic algal blooms since the mid-1990s. The worst bloom was experienced in 2004, with the bloom extending 100 miles from its origin. While the bloom was dominated by a species that did not produce toxins, species in the sample found in smaller quantities did produce toxins, similar to those found in ride-tide conditions. The bloom caused the Nation to suggest that community members not swim in the river or ingest river water.
- For decades, large mats of periphytic algae have occurred during low flow summer months along the Meduxnekeag River, home to the Houlton Band of Maliseet Indians. These algal blooms cause large diurnal shifts in dissolved oxygen content in the river waters and dramatically alter the physical and biological character of the river system.

- Contact the University of Washington's Pacific Northwest Center for Human Health and Ocean Sciences, which investigates how environmental conditions trigger blooms of harmful algae in marine waters and ultimately how these blooms impact human health. This is seen as an indicator that this problem is more national than initially thought.
- Implement and enforce nutrient criteria in National Pollutant Discharge Elimination System (NPDES) permits and water quality standards.
- Contact Office of Water and Regions about grants to develop nutrient criteria.
- Contact Regions and states about proposed Total Maximum Daily Loads (TMDLs) for nutrients. Encourage EPA to hold a tribal forum on TMDL studies to address non-point source pollution (NPS) contributions to nutrient loads.
  - Where possible, the actions and products should include a focus on risk (measurement and exposure), education, environmental justice issues, and/or restoration.

- Groups should consider whether or not this is a topic that someone from outside the TSC should be invited to speak on.
- The TSC should consider holding a conference call to discuss this priority in the spring/early summer so that tribes are more informed before summer – the times of worst blooms.

## ***Environmental Triggers for Respiratory Distress***

### **Description:**

Estimates from the National Health Interview Survey (1986-1990) indicate that age-adjusted prevalence for asthma was 4.45 percent in Native American men and 6.02 percent in Native American women, while prevalence in white men was 4.26 percent and in white women, 4.30 percent. Respiratory illnesses are on the rise everywhere, and Reservation tribal members seem to be higher than the non-Indian population. While indoor triggers are addressed by tribal health departments, outdoor triggers, seem less defined. Some of the key environmental triggers of respiratory distress that the TSC will focus on include: mold (indoor emissions) and PM<sub>2.5</sub> and PM<sub>10</sub> (outdoor emissions). Given the elevated risk of respiratory illness found in Native American communities, tribes wish to have EPA better define these environmental triggers and work with other agencies in explaining the current tribally relevant research.

### **Examples Where Tribal Impacts are felt from Environmental Triggers for Respiratory Distress**

Since 1993, California's Coachella Valley has been classified by EPA as a non-attainment area for PM<sub>10</sub> air emissions contributing to the incidence respiratory distress in these communities that impact a number of tribes living in the Valley including: Agua Caliente, Augustine, Cabazon, Torres-Martinez, and Twenty-Nine Palms. Fugitive dust sources are responsible for 97% of the PM<sub>10</sub> emissions, with construction activities, re-entrained dust from paved roads, and windblown dust from agricultural and disturbed lands representing the major sources.

Reports of are coming forth of skin infections and other serious health problems in Pine Ridge Tribal housing units that may be due to mold. Asthma and other respiratory ailments, to elevated glucose levels in other Indian communities due to mold/fungi infested housing are constantly surfacing and is an ever growing problem in Indian Country.

### **Efforts to Address This Issue:**

The requests made by tribes on this issue focus on gathering existing data and research activities in this area. The TSC discussed this request and agreed to provide the tribal representatives with any information that was available as described below.

- Provide the tribal members with the current asthma statistics related to American Indians, including children, adults, men and women and provide information on current inter-agency research being done on environmental triggers for respiratory distress that looks at American Indians as a group apart from the general population.
  - TSC Members David LaRoche (EPA OAR) and Ella Mulford (EPA AIEO) will develop a status update on the work done to date on this topic, including gathering information on environmental triggers and

work being done by the Indian Health Service on household inspections.

### ***Environmental Triggers for Respiratory Distress Special Section on Mold***

#### **Description:**

Fungi, mold in this specific case, are in a completely different kingdom of organisms called Eumycota. They are eukaryotic having a well defined nucleus enclosed by a nuclear membrane, and the cells contain a cell membrane and the various cellular organelles making it similar to animal cells.

Molds are found virtually everywhere in the environment (over 200,000 species of fungi have been catalogued by scientists, at least 200 of these have been identified as familiar pathogens<sup>A</sup>). Mold in nature break down organic waste, and because of this they are readily found in building materials ranging from wood, drywall, stucco, sheetrock, wall paper, ceiling tiles, showers, and the lists goes on.

Whereas, much is known of viruses and bacteria, little is known of mold/fungi concerning indoor air quality. New research is coming forth showing a distinct link between mold and human health and disease. Mayo clinic discovered that fungi, and not bacteria, are the culprit behind chronic sinusitis.<sup>1</sup>

Why the interests in mold? Mold/fungi release secondary metabolites called mycotoxins. These are toxins produced by molds to defend against enemies in nature which are bacteria, viruses, and other organisms such as dust mites. The well known mold *Aspergillus* produces the powerful carcinogens aflatoxin, it is the only mycotoxin regulated in America, and "is the most carcinogenic chemical known to science"<sup>2</sup>, and ochratoxin. "Although aflatoxin is the most carcinogenic substance on the planet, ochratoxin beats it ten times over in terms of toxicity and damage inflicted on the human body"<sup>3</sup>.

Mycotoxins are relatively large and non-volatile molecules (do not readily release into the air themselves), so direct contact is mostly required. The mold overcome this due to the spores they produce and release into the air.

Exposure to molds and the secondary metabolites they produce are an area of growing concern in Indian Country. The routes of entry to the human body are mainly skin contact, and inhalation into the respiratory system.

On the Pine Ridge Indian Reservation, mold has been found in 75% of the 1,700 tribal housing units. Health effects range From chronic sinusitis, severe headaches, fungal skin infections In children and elderly, upper and lower respiratory illness, and On the fringe: reports of elevated cancer cases, and diabetes worsening. This black mold is causing many tribal members to become sick. The diabetes epidemic on the Pine Ridge Reservation alone is 800% higher than the U.S. national

#### **Black Mold**

- Found in 75% of the 1,700 tribal housing on the Pine Ridge Indian Reservation
- Causes sickness and poor health among tribal members
- Health effects include chronic sinusitis, severe headaches, fungal skin infections, upper and lower respiratory illness; cancer cases rising and diabetes worsening
- Diabetes found to be 800% higher on this reservation than U.S. national average

average of diabetes in a population.

Reports of asthma and other respiratory ailments, related to elevated glucose levels in other Indian communities due to mold/fungi infested housing are constantly surfacing and are an ever growing problem in Indian Country. The environmental impact of these organisms and their metabolites, how they affect indoor air quality, and human health is the primary concern of the EPA National Tribal Science Council. An organized effort needs to be launched in Indian Country to look into this issue which affects tribes across the United States.

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#### Efforts to Address this Issue:

The EPA's Office of Indoor Air and Radiation has developed a web site dedicated to the mold issue and has also produced two documents dealing with mold. The web site is located at <http://www.epa.gov/mold/moldresources.html>. The two documents are also located there and are (1) "A Brief Guide to Mold, Moisture, and Your Home" and (2) "Mold Remediation in Schools and Commercial Buildings". Both documents can be down loaded using the PDF format. The web site also lists other resources.

### ***Pharmaceuticals in Waste Water (including personal care products and antibiotics in livestock products)***

#### Description:

Pharmaceuticals and personal care products (PPCPs), (i.e., products consumed by individuals for personal health or cosmetic reasons), comprise a very broad, diverse collection of chemical substances. PPCPs can enter the environment when PPCP residues in treated sewage effluent are released from sewage treatment systems or when raw sewage is discharged directly to surface water. In addition, antibiotic can be released directly into surface waters from fisheries management activities and from livestock rearing activities (e.g., from direct waste run-off, use of manure as fertilizer for crops, etc.). While the risks posed to aquatic organisms and humans by PPCP and low-level antibiotics are essentially unknown, the issue is receiving increasing attention within Indian Country.

Many tribes are located in rural areas with septic systems that are located above groundwater sources. As insufficient information currently exists to adequately identify the impacts of PPCPs in wastewater on tribal communities, tribes feel that additional research is needed to assess the risks of residual PPCPs and low-level antibiotics from livestock operations and their impact on human health and the environment.

The TSC tribal representatives are interested in obtaining EPA's current status on the science, research, and policy development surrounding PPCPs and low-level antibiotics in wastewater. Tribes would like to be aware of the latest scientific developments with respect to this topic in order to respond more appropriately and effectively to this issue.

Efforts to Address This Issue:

EPA has already developed a comprehensive website on this topic. Although the site was not specifically developed for tribes, it contains a great deal of useful information on the issue. It can be found at <http://epa.gov/nerlesd1/chemistry/pharma/about.htm>. Tribal representatives indicated that more education was needed on this topic and recommended that the TSC focus their efforts on research and outreach on the following key questions:

- Are there alternatives to those pharmaceuticals and personal care products that are being detected in surface and wastewaters?
- Can wastewater be applied on land without adversely affecting the environment and human health?
- What are wastewater treatment options for eliminating pharmaceuticals and personal care products?
- What are the potential human health and environmental risks associated with exposure to these chemical substances?
- What are proposed uses of wastewater containing these compounds that could be responsible for adverse impacts to humans or ecological receptors?
- What is EPA's current research plan for PPCPs?
- What is EPA's current policy on PPCPs?
- What should we know about the potential adverse impacts to groundwater from aboveground septic systems?

In response to this overall request, the TSC is undertaking the following actions:

- TSC Members Ella Mulford (EPA AIEO) and Patti Tyler (EPA Region 8) will contact Christian Daughton and Rita Schoeny (EPA OW) will contact Octavia Connerly to find out more about what Agency information is available on this topic. The TSC plans to work with these individuals to develop some educational and training materials.
- TSC members will attend RTOCs/ROCs meetings and work with the RTOCs/ROCs to identify more examples of how this issue is impacting tribes.
- EPA will post relevant information collected on this issue on EPA's Science and American Indians website or the tribal portal, as appropriate.

## ***Dioxin and Dioxin-like Compounds***

### **Description:**

“Dioxins” refer to a group of chemical compounds that share certain chemical structures and biological characteristics and are formed as a result of combustion processes such as commercial or municipal waste incineration and from burning fuels (like wood, coal or oil). At high enough doses, dioxins may cause a number of adverse health effects, including skin disease, cancer, and reproductive or developmental impacts.

In general, tribes are disproportionately impacted by chemical contaminants in the environment through their resource use practices relating to traditional lifeways. The impact to tribes when tribal resources

are contaminated extends beyond impacts to human health and the overall ecosystem to larger issues of tribal culture, spirituality, and lifestyle.

Tribes are particularly interested in understanding the current state-of-the science at EPA relating to dioxins and dioxin-like chemicals that might impact tribal health and well-being, particularly in respect to tribal diet and cultural practices that may leave them at risk to environmental exposures.

### **Efforts to Address This Issue:**

Currently, EPA is working to develop a comprehensive reassessment of dioxin exposure and human health effects. EPA submitted a draft dioxin reassessment that updates a 1995 EPA inventory of dioxin sources and analysis of the source contributions to dioxin environmental levels to the National Academy of Science (NAS) for review. The NAS is working to provide an additional review to help ensure that the risk estimates contained in the draft are scientifically robust and that there is a clear delineation of associated uncertainties. Because the dioxin reassessment is now under review by the National Research Council (and publicly available), EPA will not likely be doing anything with the reassessment for the next year or two.

The TSC first identified dioxin as a tribal science priority in September 2002 when TSC tribal representatives were interested in learning the status of the Agency’s dioxin reassessment and in lending support to the effort to make the assessment more accurate for tribal populations. Given the current status of the issue, in November 2004, the TSC agreed that the dioxin science priority should be expanded to encompass issues associated with dioxin and dioxin-like compounds, and should include:

- Dioxin Reassessment and Reference Dose;
- PCBs (co-planars);
- Burn Barrels (air emissions);
- Pulp and Paper Mills (air emissions and water discharges);

### **Examples Where Tribal Impacts are Felt by Dioxin and Dioxin-like Compounds**

- A recent study has shown significantly elevated levels of PCBs in breast milk of women from Akwesasne Mohawk Nation (New York), directly related to the consumption of contaminated fish, resulting in an advisory against breast feeding.
- Numerous tribes across the country have issued consumption advisories for dioxin and dioxin-like compounds, including Leech Lake Band of Ojibwe (Minnesota), Penobscot Nation (Maine), and Great Lakes Tribes.

- World Health Organization's Toxic Equivalents (TEQ) (for use in human health & ecological evaluations); and
- Furans.

Based on this expanded scope, the TSC tribal representatives developed a list of requests related to research and education on these topics. Specifically, the representatives requested more information on the following issues:

- What Toxic Equivalents are and how are they derived (general description). A fact sheet would help with a more in depth discussion to follow if needed.
- Sources of dioxins and dioxin-like compounds and how these compounds are regulated.
- Major exposure pathways that would impact tribes.

Based on this request for additional information, TSC member Mike Callahan (EPA Region 6) will coordinate with EPA's National Center for Environmental Assessment (NCEA) and collect relevant information and work on this issue. Mr. Callahan will create a fact sheet that references these activities. TSC member Dana Davoli (EPA Region 10) will provide assistance with the development of the fact sheet.

Another recommendation that will be considered by the TSC at future meetings is reviewing the Office of Prevention, Pesticides, and Toxic Substances (OPPTS) Tribal Strategic Plan to see if there are any synergies (e.g., objective 4.3.2 refers to dioxin in Alaska, but this could be generalized to encompass all tribes).

### ***Persistent Bioaccumulative Toxics Source Reduction***

#### **Description:**

Persistent Bioaccumulative Toxic (PBT) pollutants are chemicals that are toxic, persist in the environment, bioaccumulate in food chains and, thus, pose significant risk to human health and ecosystems. Examples of PBTs include: aldrin/dieldrin, mercury and its compounds, chlordane, DDT, DDP, DDE, hexachlorobenzene, dioxins, furans, and PCBs. The biggest concerns about PBTs are due to the fact that they transfer rather easily among air, water, and land, and span boundaries of programs, geography, and generations.

In general, tribes are disproportionately impacted by persistent chemical contaminants in the environment because of their unique resource use that often occurs as a result of their traditional lifeways. The impact to tribes when tribal resources are contaminated extends beyond impacts to human health and the overall ecosystem to larger issues of tribal culture, spirituality, and lifestyle, particularly in relation to traditional dietary practices of

#### **Specific Examples Where Tribal Impacts are Felt from PBTs**

- Impacts to Aleutian food chain consisting of fish and marine mammals that are being impacted by persistent bioaccumulative toxic substances.
- Potential impacts of pesticide residues on crops in tribal communities.
- Repatriation of tribal artifacts that were contaminated during the preservation process.

tribal communities.

Tribes are interested in learning what EPA is doing concerning PBTs, both from a research and a regulatory perspective. In addition, tribes would like to see additional testing, outreach, and education for tribes on this issues and the development of a national strategy for testing subsistence foods.

Efforts to Address This Issue:

The TSC is working to identify efforts by which both (1) TSC efforts and (2) existing EPA initiatives and programs may be able to help address the issue of PBTs and its impact to tribal health and traditional lifeways. To help identify appropriate efforts and appropriate entities with whom the TSC can collaborate on this issue, the Council developed a list of questions to be addressed:

- What is the current list of PBTs?
- What research is being done on PBTs? (ORD, OPPTS, and OW)
- What regulator controls are in place to eliminate PBTs? (OPPTS and OECA)
- What is the process for getting new chemicals on the PBT list? Can Tribes propose chemicals to be added? (OPPTS)
- What are the impacts of PBTs on human health, particularly tribal, and the ecosystem? (ORD, OPPTS, and OW)
- How does the Agency assess emerging chemicals? Can the tribes propose emerging chemicals to the Agency for action? (OPPTS)
- What actions and/or products would the TSC like to pursue to help address this issue?
  - Need to develop general presentation on PBTs (What they are, how they operate, and why they are important to tribes) and current status on controlling PBTs, for a TSC conference call. (OPPTS)
  - More specific discussion could be warranted based on the presentations above. TSC to determine specific need.
  - An April to June timeframe for the first presentation was suggested.
  - Need to address the questions listed above.

***Endocrine Disruptor Chemicals***

Description:

In recent years, there has been increasing concern that chemicals (pesticides, commercial chemicals and environmental contaminants) might be disrupting the endocrine system of humans and wildlife. Chemicals with the potential to interfere with the function of the endocrine system are called endocrine disrupting chemicals (EDCs).

In general, tribes are disproportionately impacted by chemical contaminants in the environment through their resource use practices relating to traditional lifeways. The impact to tribes when tribal resources are contaminated extends beyond impacts to human health and the overall ecosystem to larger issues of tribal culture, spirituality, and lifestyle.

Tribes are particularly interested in (1) understanding the current state-of-the science at EPA relating to chemicals that might be disrupting the endocrine system of humans and wildlife, (2) education, training, and outreach opportunities to provide tribes with an opportunity to develop tribal capacity and participate in EDC research, and (3) tribally specific EDC research.

Efforts to Address This Issue:

The tribal representatives on the TSC developed some specific requests related to their overall interest in finding more out about this topic. These requests and the TSC's planned activities related to these requests appear below.

**Building Tribal Capacity for EDC Research**

In 2003, upon hearing from the Region 9 RTOC that EDCs were an important, emerging concern for EPA and that the Agency was actively developing analytical methods for EDCs and was planning to recruit outside laboratories to verify these EDC analytical methods, 29 Palms Laboratory proceeded to set up a molecular biology laboratory to perform EDC analysis and microbial source tracking. 29 Palms, an EPA- and state-sponsored tribal environmental laboratory, intends to build sufficient capacity to participate with EPA in developing expertise for EDC monitoring and microbial source tracking. To increase tribal participation, the laboratory is working with the Pyramid Lake Paiute Tribe's fisheries program to breed fathead minnows for developing and implementing the vitellogenin gene expression assay for estrogenic EDCs. The laboratory is also collaborating with EPA's Office of Research and Development to develop SOPs and QA plans for these technologies.

- Need to obtain an update of the work that the Agency is doing in the area of EDCs. Suggest that the update be general in nature and done on a TSC conference call.
  - TSC member Liz Resek (EPA OPPTS) will develop a written update on what EPA is doing in the area of EDC research and training.
- The TSC should develop more specific topic areas for in-depth presentations dealing with the impacts/effects on tribes and the science behind what we are doing based on the information presented on the call. This information could be conveyed to tribes through a workshop/breakout session that has three components: basic EDC 101 – What are EDCs, how do they operate and why are they important; what is the science behind the work that we (EPA) are doing; and what are the known impacts of EDCs on human health, particularly tribal, and on environmental well-being.
  - The TSC will form a subcommittee to determine what a Basic EDCs 101 course should address. The committee may include a representative from EPA AIEO, the Institute for Tribal Environmental Professionals, and the Tribal Air Monitoring Support Center and Dan Murray from EPA ORD. Following the training, there may be an opportunity for tribes to provide input into the list of chemicals to be tested to determine whether or not they should be listed as an EDC.
- Need to get to a wider tribal audience. This workshop/breakout should be presented at a tribal national environmental meeting such as the National Tribal Conference on Environmental Management.
  - The TSC will consider conducting a pilot via conference call to a certain number of Regions to communicate EDC information to tribes via phone.

The TSC will consider sponsoring a workshop/breakout session with three components on EDCs (i.e., Basic EDCs 101, the science behind what EPA is doing on EDCs, and known impacts of EDCs).



# Paper on Tribal Issues Related to Tribal Traditional Lifeways, Risk Assessment, and Health & Well Being:

*Documenting What We've Heard*

April 2006



*Developed by:*  
*The National EPA-Tribal Science Council*

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### Current Tribal Representatives:

Dan Kusnierz, Penobscot Nation  
Linda Logan, Tonawanda Seneca Nation  
Michael Bolt, Eastern Band of Cherokee Indians  
Troy Pierce, Poarch Band of Creek Indians  
Christine Berini, Fond du Lac Band of Lake Superior Chippewa  
Curtis Munoz, Kiowa Tribe  
Denise West, Winnebago Tribe of Nebraska  
Richard Janssen, Confederated Salish and Kootenai Tribes  
Vickie Kujawa, Flandreau Santee Sioux Tribe  
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Dave Nelson, Cheyenne River Sioux Tribe

### Former Tribal Representatives:

James Ransom, Saint Regis Mohawk Tribe  
Brenda LaFrance, Mohawk Nation of Akwesasne  
Bernadette Hudnell, Mississippi Band of Choctaw Indians  
Steve Terry, Miccosukee Tribe of Florida  
John Persell, Minnesota Chippewa Tribe  
Kendal Coats, Muscogee (Creek) Nation  
Gina Kneib, Sac & Fox Nation of Missouri  
Fran King-Brown, Southern Ute Indian Tribe  
Kesner Flores Jr., Cortina Indian Rancheria  
Clay Bravo, Hualapai Tribe  
Cisney Havatone, Hualapai Tribe  
Chris Gannon, Confederated Tribes of Warm Springs  
Shawna Larson, Chickaloon Village

### Current EPA Representatives:

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Region 2 Roland Hemmett  
Region 4 Thomas Baugh  
Region 5 Gary Gulezian  
Region 6 Michael Callahan  
Region 7 Brenda Groskinsky, Elizabeth Wendt  
Region 8 Patti Tyler  
Region 9 Michele Dineyazhe, Bobbye Smith  
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OPPTS Elizabeth Resek  
ORD Thomas Barnwell  
OSWER David Charters  
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### Former EPA Representatives

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Region 2 Barbara Finazzo  
Region 5 Robert Springer  
Region 6 Norman Dyer  
Region 7 John Helvig  
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OEI Steve Young  
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OPPTS Sherry Sterling, Carl Etsitty, Ben Smith  
OSWER Peter Grevatt  
OW Arnie Kuzmac  
ORD Harold Zenik

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# Table of Contents

<b>ACKNOWLEDGMENTS .....</b>	<b>2</b>
<b>PURPOSE OF THIS DOCUMENT.....</b>	<b>4</b>
<b>BACKGROUND.....</b>	<b>5</b>
<b>INTRODUCTION .....</b>	<b>7</b>
<b>WHAT IS RISK AND HOW DOES EPA USE IT? .....</b>	<b>8</b>
<b>SECTION I: CHANGING THE CURRENT RISK ASSESSMENT POLICIES AND PROCEDURES.....</b>	<b>12</b>
Increase Educational Opportunities for Tribes on EPA's Risk Assessment Process .....	12
Educating EPA on Tribal Values and Culture .....	13
Outreach and Involvement of Tribes.....	13
Valuation of Natural Resources.....	14
Data Collection and Use .....	15
Unique Tribal Exposures .....	17
<b>SECTION II: DEVELOPING A NEW PARADIGM.....</b>	<b>22</b>
Incorporate a Health-based Focus .....	22
Focus on Risk Prevention .....	22
Incorporate Cumulative Impacts .....	22
Create a Holistic Paradigm---One that Incorporates Impacts to Community Health, Culture, Lifeways, Well-being and the Environment .....	22
Include Health and Wellness Indicators .....	23
Use a Cross-Media Approach .....	25
Reflect the Precautionary Principle.....	25
Recognize that for Some Tribes, a "Zero Contamination Policy" Exists .....	25
Work with Tribes on a Government-to-Government Basis.....	25
<b>SOURCES AND REFERENCES .....</b>	<b>27</b>

## **Purpose of This Document**

This document is meant to consolidate the many issues and ideas that have emerged from the various workshops that the National EPA-Tribal Science Council (TSC) has held on the topic of risk assessment, health and well-being, and tribal traditional lifeways. It is intended to serve as a starting point for discussion by EPA staff as to potential approaches for addressing some of these issues from an EPA perspective. Although it was not written by tribes, it is meant to capture tribal perspectives that emerged from these events.

## Background

In September of 2002, the TSC tribal representatives formally identified tribal traditional lifeways and subsistence as their highest priority science issue, with a focus on both looking at ways to integrate tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment policies and procedures as well as discussing development of a potential new environmental decision-making paradigm, one focusing on human health and ecological well-being.

This issue impacts tribal communities throughout Indian Country. Tribes assert that EPA's current risk assessment policies and procedures are not protective of tribal resources and lifeways, and are not adequate to account for or include a holistic approach for assessing the social, cultural, and spiritual values, beliefs, and practices that link tribal people to their environment. Current risk scenarios and risk factors are geared toward urban settings in the United States. They were not developed with subsistence lifestyles in mind, and, therefore, tribes that practice tribal traditional lifeways that focus on subsistence practices or lifestyles outside the "mainstream" are less protected since they are subject to increased exposure. In addition, the risk management solutions identified from the current risk assessment methodologies often force tribal populations to alter activities that are essential to their existence, such as those constraints imposed by the creation and adoption of fishing and hunting advisories.

Tribes wish to play an integral role in developing improved risk assessment policies and procedures within the Agency. In addition, they ask that EPA allow for increased consultation and coordination with tribal governments when risk assessment and management activities are undertaken that potentially impact their lands, resources, and cultural practices. As sovereign nations, tribes assert that they possess a legal and moral right to be involved in decision making that affects their people, lands, and aboriginal and treaty rights due to the federal trust responsibility, which arises from Indian treaties, statutes, executive orders, and the historical relations between the United States and Indian tribes.

This trust responsibility is underscored by EPA's Indian Policy, which supports tribal "self-government" and "government-to-government" relations between federal and tribal governments. Under EPA's 1984 Indian Policy, EPA recognizes tribal governments as sovereign entities with primary authority and responsibility for the reservation populace. Accordingly, EPA will work directly with tribal governments as the independent authority for reservation affairs, and not as political subdivisions of states or other governmental units.

Formed in 2000, the National EPA-Tribal Science Council's mission is to provide a forum for tribes and EPA to work collaboratively to identify and address national environmental science issues of importance to both tribes and EPA. To ensure that the TSC has a national and cross-program perspective, it is composed of a single tribal representative from each EPA Region with federally recognized tribes, a tribal representative from Alaska, and an Agency representative from each EPA Program and Regional Office.

The TSC tribal representatives formally raised the issue of tribal traditional lifeways and subsistence lifestyles and their lack of representation in current risk assessment policies and procedures as a priority for the Council to address in September 2001; this issue was reiterated as a tribal science priority by the Council in November 2004. To address the issue, the TSC decided to focus on both the short-term goal of integrating tribal traditional lifeways and subsistence lifeways into EPA's risk assessment process and the more long-term goal of developing a new environmental decision-making paradigm for EPA consideration, one focusing on human health and ecological well-being. Specifically, the TSC has sponsored three workshops that have brought together tribal representatives and risk experts to help advance its thinking on these topics over the past two years. They have included the following:

TSC Workshop on Health & Well Being and Risk Assessment held in Albuquerque, NM on February 19-20, 2003. The purpose of this workshop was to convene specific tribal representatives working on addressing these topics and EPA staff experienced with the risk assessment process to gain a better understanding of the issue and better insights into the way EPA and tribes view the current risk assessment process.

TSC Workshop on Health & Well Being and Tribal Traditional Lifeways held in Reno, NV on May 13-15, 2003. The purpose of this workshop was to share the health and well-being concept with a broader audience and get feedback that would help build on information collected during the "National Subsistence Technical Planning Meeting for the Protection of Traditional & Tribal Lifeways" hosted by the Alaska Native Science Commission in Alaska in April 2003.

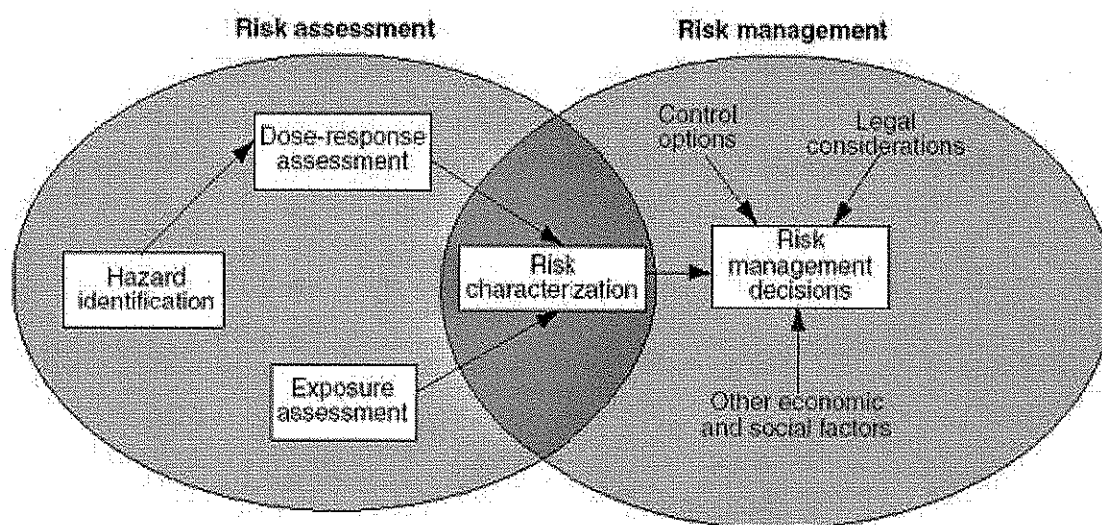
TSC Workshop on Addressing Tribal Traditional Lifeways in EPA's Risk Assessment Policies and Procedures held in Reno, NV on January 24-27, 2005. The purpose of this workshop was to convene a group of tribal representatives working in the area of risk assessment and a broader audience of observers to talk about both short-term things that EPA and tribes could do to address the current risk assessment process and identify approaches for more long-term changes that are more tribally appropriate.

## Introduction

The three TSC workshops resulted in a great deal of discussion by tribal representatives both on the short-term goal of integrating tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment process and the more long-term goal of developing a new environmental decision-making paradigm for EPA consideration. The following sections highlight and categorize some of the issues, ideas, and comments presented by the tribal representatives at these workshops. Section I presents the information provided during discussions by tribal participants regarding improving EPA's current risk assessment process through the integration of tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment policies and procedures. Section II presents the information provided by tribal representatives regarding the potential development of a new environmental decision-making paradigm that would focus on human health and ecological well-being.

## What is Risk and How does EPA use it?

Generally, risk refers to the possibility of injury, harm, or other adverse and unwanted effects. The analysis, management, and communication of risks to human health and safety and environmental quality is the foundation for the risk assessment paradigm. The National Academy of Sciences (NAS) published the environmental risk assessment paradigm (Figure 1) in 1983, National Research Council. The NAS concluded that the paradigm consists of two separate elements - risk assessment and risk management. NAS defines risk assessment as “a process in which information is analyzed to determine if an environmental hazard might cause harm to exposed persons and ecosystems.”



Source: EPA Office of Research and Development.

Figure 1. Diagram of risk assessment paradigm

EPA uses the paradigm and definitions published by NAS as their basic approach in assessing and managing environmental risks. The overall process provides a way for EPA's environmental decision making including legal, regulatory, policy and criteria. Figure 1 shows the basic steps in the assessment of human health risk. While ecological risk assessment uses a different framework, both frameworks provide the scientific data and information from the assessment that feeds into risk management decisions that also considers other legal, economical, social, other factors.

Whether one is assessing human or ecological risk, EPA uses relevant data and information to the extent possible; limitations on data use can include lack of appropriate peer review, unacceptable quality, an inability to make the information available to the public or ethical considerations. Where relevant chemical- or exposure-specific data cannot be found or can't be used, EPA employs default assumptions and extrapolations to fill in the data gaps so that the risk assessment process can proceed. Use of defaults and assumptions is described in detail in *Risk Assessment Principles and Practices* (U.S. EPA, 2004). Occasionally, the results of hazard

identification and dose response are published separately and represent many people in the United States. For example, the EPA Integrated Risk Information System (IRIS) provides this type of information to assist risk assessors, who must perform their own exposure assessment and characterization of risk. Additional details for both the human and ecological risk assessment processes are described below.

### **Human Health Risk Assessment**

EPA has developed Guidelines for assessing risk to humans that follow the four steps in Figure 1: Hazard Identification, Dose-Response Assessment, Exposure Assessment, and Risk Characterization.

#### **Hazard Identification**

This step poses some fundamental questions. Does this environmental contaminant pose a hazard to humans? Does it cause cancer, kidney damage, developmental effects or some other health endpoint? EPA generally uses a weight of the evidence approach in these decisions. All data on studies in humans, animals or *in vitro* tests are evaluated for quality and as to whether they demonstrate an effect. Both positive data and those which do not show an effect are considered using frameworks established in these EPA publications: *Guidelines for Mutagenicity Risk Assessment* (U.S. EPA, 1986a); *Guidelines for Developmental Toxicity Risk Assessment* (U.S. EPA, 1991); *Guidelines for Reproductive Toxicity Risk Assessment* (U.S. EPA, 1996); *Guidelines for Carcinogen Risk Assessment* (U.S. EPA 1986b, revised U.S. EPA 2005). These guidelines provide a framework for evaluating data and choosing the mode of action whereby the contaminant produces its effect

#### **Dose-Response Assessment**

This is the step which determines the potency of the contaminant in producing health effects. The dose response assessment may estimate a level of exposure without appreciable risk or a level of risk at a particular exposure. Generally, the dose-response assessment consists of two parts: the evaluation of data in the observable range, and the extrapolation from the observable range to low doses. In the first part, the risk assessor may apply a biologically based model or fit a mathematically derived curve to the data for an effect, such as tumors observed in rats. The choice of extrapolation method below the point of departure depends on consideration of the mode of action. When the mode of action implies a threshold, EPA generally calculates a reference dose or reference concentration (RfD or RfC), by dividing the point of departure by a series of factors to account for variability and uncertainty. The methodology can be found in *A Review of the Reference Dose and Reference Concentration Processes* (U.S. EPA 2002). When the mode of action implies linearity of response at low dose, then procedure is to draw a line from the point of departure through the origin of the dose response curve. The estimate of potency is the slope of the line. For contaminants thought to be carcinogenic, low dose linearity is the default when the mode of action is not known.

#### **Exposure Assessment**

In this step the risk assessor determines how people are exposed or come in contact with the contaminant. Is it inhaled, eaten in foods, ingested in water or is there some other route of exposure? The risk assessor will estimate the amount of contaminant to which different

populations will be exposed. In the best circumstances this estimate will use data specific to the population in question; most often it will use models or rely on defaults for amount of air inhaled, amount of soil ingested and so on. If the data and methods are available, exposure assessment will include estimates of the amount of contaminant which reaches the target organs. EPA has published *Guidelines for Exposure Assessment* (U.S. EPA 1992) as well as an *Exposure Factors Handbook*, (U.S. EPA 1997) listing defaults for ingestion, body weights and so forth; the latter document is being updated.

### Risk Characterization

This final step combines all the information and judgments from hazard identification, dose response and exposure assessment. The risk characterization should include a description of the nature and magnitude of the risk, an interpretation of the adversity of the risk, a summary of the confidence or reliability of the information available to describe the risk, areas of where information is uncertain or lacking completely, and documentation of all of the evidence supporting the characterization of the risk.

The risk characterization can take many forms and be more or less lengthy. For example, in the Mercury Study Report to Congress, the risk characterization comprised an entire volume, which provides estimates of numbers of people at risk, who was particularly susceptible, extent of risk to wildlife, and a comparison of the magnitude of risks between wildlife and humans. In all cases, EPA's Risk Characterization Policy (U.S. EPA 2000) requires that the risk assessment be transparent, clear, reasonable and consistent with other assessments of similar scope. Whenever supported by data and methods, the risk characterization will include not only descriptions of uncertainty and variability, but also quantitative estimates of uncertainty or variability.

### **Ecological Risk Assessment**

Ecological risk assessment "evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors" (U.S. EPA, 1992a). The process is used to systematically evaluate and organize data, information, assumptions, and uncertainties in order to help understand and predict the relationships between stressors and ecological effects. An assessment may involve chemical, physical or biological stressors, and one stressor or many stressors may be considered. Ecological risk assessment provides valuable information for environmental decision making by giving risk managers an approach for considering available scientific information along with the other factors needed to consider (e.g., social, legal, political, or economic) in selecting a course of action.

Ecological risk assessment includes three primary phases: problem formulation, analysis, and risk characterization. In problem formulation, risk assessors evaluate goals and select assessment endpoints, prepare the conceptual model, and develop an analysis plan. During the analysis phase, assessors evaluate exposure to stressors and the relationship between stressor levels and ecological effects. In the third phase, risk characterization, assessors estimate risk through integration of exposure and stressor-response profiles, describe risk by discussing lines of evidence and determining ecological adversity, and prepare a report. The interface among risk assessors, risk managers, and interested parties during planning at the beginning and

communication of risk at the end of the risk assessment is critical to ensure that the results of the assessment can be used to support a management decision.

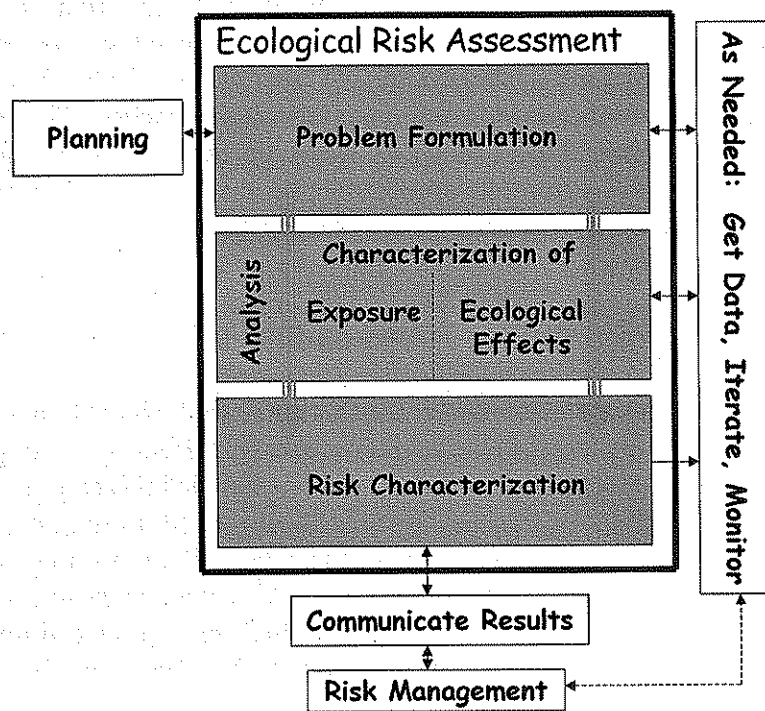


Figure 2. Diagram of Ecological Risk Assessment

## **Section I: Changing the Current Risk Assessment Policies and Procedures**

Although tribes have expressed interest in having EPA develop a new, more tribally appropriate decision-making process that would serve as an alternative to the current risk assessment paradigm, a significant number of the discussions the TSC has had with tribes have focused on changes that could be made to improve the current risk assessment process. The sections that follow highlight the various issues that were raised by tribal representatives during the three workshops convened by the TSC regarding how to change the current risk assessment process to be more reflective of tribes' needs in the near term. The issues are presented in no particular order.

### **Increase Educational Opportunities for Tribes on EPA's Risk Assessment Process**

In general, tribal representatives have expressed a need for increased educational opportunities about risk-related topics. As a workshop panel member at the 2005 Reno workshop, stated, a disconnect exists between data collection efforts and how this data is utilized to understand human, ecological, and community impacts. Additional education and training is important in enabling tribal members to better understand the risks associated with exposures and impacts. In the short-term, EPA should support and develop education and risk assessment tools to allow tribes to better utilize environmental and risk data to reduce their exposures and impacts. (2005 Reno pg 25-26) The specific educational topics identified by tribal representatives are described below.

#### ***Risk Assessment Paradigm***

At the 2003 Albuquerque workshop, a tribal participant indicated that tribes frequently do not grasp their regulatory situation and the implications of ARARs and NEPA/CERCLA/NRDA processes involving risk assessment and associated data collection. (2003 Albuquerque, pg 16) Although EPA presented a half-day risk assessment training course at the 2005 Reno workshop that provided participants with an overview of basic risk assessment terminology and processes, tribal participants indicated that they would have preferred a course that was longer and more tribally focused. A participant suggested that a full- or 3/4-day training course on risk assessment would have better educated participants on the basics of risk assessment. There was general agreement from training participants that those providing risk assessment training to tribes should have experience working with tribal communities and possess an understanding of tribal structure, culture, and lifeways. Participants felt that any risk assessment training provided to tribes should provide real-life examples and case studies specific to Indian Country. (*Tribal Science Council Risk Assessment/Health & Well-being Workshop: Training Evaluation Summary, Comments Summary.*)

#### ***Risk Communication***

At the 2005 Reno workshop, a tribal participant indicated that there is often a

misconception by tribes that they will be able to use risk assessment data to identify and prove the source of health impacts within their community. Tribes are often disappointed by the risk assessment process when clear health impacts cannot be demonstrated. (2005 Reno, pg. 18) Additional education and training are needed so that tribes understand how risk assessment data are used to understand human, ecological, and community impacts and how this information is then utilized in risk management decision making.

#### ***Risk Ethics and Informed Consent***

When working with tribes on risk assessment studies and gathering potentially sensitive tribal data, it is important that tribes are educated on issues of informed consent and risk ethics, ensuring that tribes are provided adequate information on both the possible risks and the potential benefits of their involvement to allow them to make informed decisions as to whether and how they wish to be involved in risk assessment processes. During the 2005 Reno workshop, a participant representing a tribal organization identified the specific need for training on risk ethics and informed consent, highlighting the advantages and possible disadvantages of tribal participation in the risk assessment process. (2005 Reno, pg. 24)

#### **Educate EPA on Tribal Values and Culture**

At the 2003 Reno workshop, there was general consensus that tribal communities need to be involved in educating EPA on tribal values and in changing Agency culture to allow for tribal issues and concerns to be recognized and incorporated into policy decisions. (2003 Reno, pg. 12) During the 2003 Reno workshop, a tribal speaker reflected this sentiment more broadly, indicating that tribes need to educate the outside world as to the needs and values of native peoples. (2003 Reno, pg. 10)

#### **Outreach and Involvement of Tribes**

In a number of discussions, tribal representatives have emphasized the importance of early and continued involvement by tribes throughout the risk assessment and risk communication process. Workgroup members at the 2005 Reno workshop, made a number of suggestions for promoting early and continued communication with tribes, with the goal of improving risk assessment policies and procedures. These included:

##### ***Tribal Consultation***

Efforts are needed to ensure that tribes are appropriately consulted on risk assessment activities, particularly in respect to gaining insights into potential historical observations regarding environmental impacts and change. (2005 Reno, pg. 10-11) During the 2003 Albuquerque workshop, a tribal representative observed that consultation with tribes during the risk assessment process is vital. She observed that the key to defining risk lies in defining risk from a tribal community's perspective and noted that EPA and tribes often possess differing views on risk. EPA is often addresses risk from a media-focused, media-driven perspective and tribes are often most concerned with the direct impacts of various risk factors on the community as a whole. As a result, government-to-government consultation between EPA and individual tribal governments is extremely

important to allow for adequate risk characterization and definition. (2003 Albuquerque, pg. 6) However, additional clarification is needed in defining how tribal consultation will occur in terms of both site-specific (e.g., Superfund site cleanup) and national-level processes (e.g., establishment of drinking water standards and re-registration of pesticides). Clarification is also needed regarding with whom the Agency will consult (e.g., tribal government, tribal elders, tribal organizations, etc.). A suggestion was made during the 2005 Reno workshop, that the tribal consultative process being developed by the EPA American Indian Environmental Office (AIEO) be incorporated into any tribal collaboration and communication efforts involving the development of new risk assessment policies and procedures. (2005 Reno, pg. 28)

#### ***Formal Agreements Regarding Decision Making***

EPA and tribes should enter into a formal agreement prior to the planning and problem formulation phase to generate a two-way conversation regarding the issues involved and to provide an opportunity for the tribes involved to identify their unique questions and concerns. At the 2005 Reno workshop, participants indicated that EPA and tribes should hold upfront discussions to determine how information generated during the risk assessment will be used and that tribes should be allowed to enter into a co-decision making process if tribal lands may be impacted. (2005 Reno, pg. 10-11)

#### ***Resources for Tribal Involvement***

In addition, when providing for appropriate involvement and coordination with tribes, consideration needs to be given to ensure that tribes possess sufficient resources to be able to participate. During the 2005 Reno workshop, there was general agreement from participants that a number of tribes lack sufficient technical and financial resources to assess and manage risks, while at the same time these tribes often have to contend with large tracts of land, cross-media contamination, and long- and short-term exposures. (2005 Reno, pg. 29) At the 2003 Albuquerque workshop, participants reported that the funding made available for tribes for risk assessment is "woefully inadequate and inconsistent." (2003 Albuquerque, pg. 16) For tribes to be effectively involved, they need to possess sufficient resources, such as, travel, funding for participation, research, etc. (2005 Reno, pg. 11)

#### ***Valuation of Natural Resources***

During the 2005 Reno workshop, a TSC member observed that one of the major reasons that risk assessment does not work well in Indian Country is that a disconnect exists in the way that tribal and non-tribal communities value the environment and their resources. (2005 Reno, pg. 19) While EPA factors economic considerations into its risk management decisions, thereby necessitating that an economic (dollar) value be placed on natural resources, many tribal communities do not accept monetary valuation of their resources. Some tribal representatives have indicated that valuation metrics that do not involve the concepts of "Western economies" are needed. (2005 Reno, pg 29) At the 2003 Albuquerque workshop, a suggestion was made by a tribal member that traditional economic variables that are used by the Agency be replaced with "economic" variables of consequence to tribal communities, such as relating things in

terms of valued tribal resources (e.g., number of moose hunted by a tribe). (2003 Albuquerque, pg. 11)

### **Data Collection and Use**

During the three workshops, tribal representatives identified a number of issues related to data collection and use within the context of risk assessment processes. These issues, which included the need to incorporate both tribal traditional knowledge and qualitative data into the risk assessment process, the need to develop methods for ensuring appropriate collection of data from tribal sites, the need to ensure data ownership by tribes and to protect confidentiality of tribally sensitive data, and the need to improve quality assurance of tribal data. Each of these issues is further explained below.

#### ***Incorporate Tribal Traditional Knowledge***

Many tribal representatives participating in the TSC workshops emphasized that tribes possess a great deal of observational and experiential knowledge about their environment. They indicated that this knowledge, often referred to as tribal traditional knowledge and tribal ecological knowledge, should be incorporated into existing risk models and scenarios. At the 2003 Albuquerque workshop, a tribal representative observed that the work that EPA is conducting on risk assessment is not new and that tribes have observational and experiential knowledge with the issue dating back for centuries. She observed that when developing tribal risk assessments, this direct observational and experiential knowledge needs to be incorporated. She explained that in tribal communities, this type of direct observation, experience, and habituation, which is handed down by the generations, is held to be much more truthful than secondhand knowledge, represented by the traditional Western science methodology of gathering and incorporating scientific data into reports. (2003 Albuquerque, pgs. 5-6)

During the 2005 Reno workshop, it was indicated that both “Western” science and tribal traditional knowledge need to be recognized as forms of science (2005 Reno, pg. 15), that tribal traditional knowledge should be included as an input into risk assessment on equal footing with scientific data (2005 Reno, pg. 27), and that guidance is needed on where and how to include tribal traditional knowledge into the risk assessment process (e.g., in identifying appropriate sampling sites and sampling periods.) (2005 Reno pg. 28)

In a related discussion at the 2005 Reno workshop, a tribal representative spoke of the need for generating valid ethnographic data to use in risk assessment processes, noting that anecdotal tribal information should not be dismissed, but that care should be taken to ensure that the data is valid (i.e., that the data collected are systematic and repeatable and are considered “good data”). (2005 Reno, pg. 24)

#### ***Incorporate Qualitative Data***

At the 2005 Reno workshop, there was discussion on the need to incorporate qualitative, rather than strictly quantitative, data into EPA’s risk assessment process, particularly as some tribal members indicated that they did not agree that spiritual and cultural aspects

of a tribe's lifestyle could be quantified. (2005 Reno, pg. 22) Methods are needed for incorporating this qualitative information into the risk assessment process so that it is provided to decision makers when making risk management decisions. At the January 2005 workshop in Reno, NV, there was recognition that both qualitative and quantitative approaches to risk assessment exist and that debate on these issues is healthy. (2005 Reno, pg. 28) A tribal representative indicated that qualitative data should be allowed to be brought into the risk assessment process and given equal weight with quantitative data. (2005 Reno, pg. 23) Several workshop panel members agreed that more discussion is needed as how best to incorporate qualitative data inputs into the risk assessment process in an equitable way, as risk assessments are constrained by current laws and mandates. (2005 Reno, pg. 25)

#### ***Appropriate Data Collection from Tribal Sites***

Tribal members noted on various occasions that the samples and data collected for risk assessment purposes from tribal sites was often done without tribal involvement, and, therefore, was not representative of the impacted tribe's health and lifeways. At the 2005 Reno workshop, a TSC tribal representative indicated the need for tribes to be involved in the planning and development of risk assessments, particularly in regard to sampling protocols to determine where and when to sample and, in the case of fish sampling, what parts of the fish to sample. (2005 Reno, pg. 18) In addition, during the 2003 Albuquerque workshop, a tribal representative spoke of her experience involving baseline human health risk assessments conducted on lands on the Akwesasne Reservation in New York. She highlighted a number of instances in which the tribe felt that tribal concerns were not taken into account during data sampling and collection. These included the lack of data on consumption rates for women of child bearing age in the assessment, the collection of data on limited stretches of the river system that was impacted, and limited data on only two fish species that were not considered to be the most important species by the tribal community. (2003 Albuquerque, pg. 13)

#### ***Data Ownership and Confidentiality***

The issue of data confidentiality and ownership is very important to tribal communities, who can be reluctant to provide sensitive tribal data to outside entities. Such a reluctance to share data can impact risk assessment processes. As noted by an EPA representative at the 2005 Reno workshop, a major obstacle to complete the Tribal LifeLine Project has been EPA's ability to access tribal data. (2005 Reno, pg. 20)

Data access and ownership is particularly problematic due to concerns by tribes that providing tribal data and information driving risk assessment studies will subject the data to become publicly available under Freedom of Information Act (FOIA) requirements. A tribal representative at the 2005 Reno workshop, indicated that, recognizing the need to work within the framework of the existing risk assessment framework and within the parameters of FOIA, tribes should be educated on the various options that exist for protecting tribal data while working within these structures. A tribal representative observed that tribal exposure models are each context-specific, and,

therefore, there are ways to include cultural impacts and risks in a general way that would allow tribes to use these models. (2005 Reno, pg. 23)

#### ***Quality Assurance of Tribal Data***

Some frustration was voiced that, in the past, EPA has rejected tribally developed data from risk assessment studies. (2003 Albuquerque, pg. 13) During the *2005 Reno workshop*, a tribal representative emphasized that in developing tribal exposure assessments, it is necessary to gather peer reviewed data that meet the strict rules of evidence and are well documented. During the workshop, it was also suggested that collaboration between EPA and tribes is needed to ensure that the data developed by tribes is considered valid and is accepted under EPA's laboratory standards. (2005 Reno, pg. 29) and that additional focus on data quality assurance standards is needed to ensure that the data developed and provided is valid and will be accepted by EPA.

#### **Unique Tribal Exposures**

Tribal representatives have asserted that current risk assessment policies and procedures do not take into account or allow for unique characteristics of tribes and tribal communities that create unique tribal exposures, and, therefore, are not fully protective of tribal health and lifeways. Throughout each of the three workshops, tribal members discussed numerous aspects of tribal communities and tribal lifestyles that result in their unique exposure factors, including:

***Tribes Represent Relatively Small Populations:*** At the 2005 Reno workshop, a tribal member indicated that tribal populations are unique because they possess relatively small population numbers in comparison to the general U.S. population. As a result, the individual indicated that tribes are unique in facing the possibility of cultural loss and even extinction in the face of environmental hazards. The tribal member suggested that EPA consider different standards and a different definition of "population" where tribal communities are involved. (2005 Reno, pg. 9) Small population size also makes it difficult for many tribes to demonstrate significant human health impacts during standard risk assessments so as to warrant action by regulators. As noted by a tribal representative at the 2005 Reno workshop, within existing risk assessment models, many tribes are not large enough to register a population impact or "cancer cluster;" therefore, many tribes are trying to identify other environmental indicators to demonstrate environmental impact. (2005 Reno, pg. 25)

***Tribes are Tied to Fixed Land and Resource Bases:*** At the 2005 Reno workshop, a tribal member indicated that tribes are unique in that tribal communities are tied to their lands and are not able to simply move away from contamination sources when impacts occur. (2005 Reno, pg. 29) In addition, at the 2005 Reno workshop, a TSC representative observed that tribal resources and their value to the tribe are very much tied to their lands and their geographic proximity. He described an instance in which a biological opinion paper developed by the U.S. Fish and Wildlife Service (USFWS) for bald eagles nesting along the Penobscot River was developed. The risk assessment conducted by USFWS concluded that the population of eagles in the entire Northern States Recovery Region (comprising 24 states) would not be jeopardized if the eagles

along the river were removed and, therefore, allowed the “taking” to occur. However, the eagles were part of the Penobscot Indian Reservation, and the cultural impact to the tribe from the loss of the eagle community on their Reservation was never considered in either the risk assessment or risk management decision processes. At issue was the fact that it was the eagle population within the Reservation to which the tribe has close cultural connections and, therefore, impacted the tribe and not the eagles elsewhere in the country. (2005 Reno, pg. 18-19)

***Tribes Possess Unique Dietary, Religious, and Cultural Practices:*** As discussed during the 2005 Reno workshop, each tribe possesses a unique variety of tribal practices, including tribal diets, religious practices, and cultural practices (e.g., basket making, use of medicinal plants, and sweat lodge ceremonies) that should be factored into tribal exposure scenarios. (2005 Reno, pg. 28) Recognition is needed that impacts affecting tribal culture and diet greatly impact tribal health. (2005 Reno, pg. 29) During the 2003 Reno workshop, a tribal participant indicated that exposure scenarios need to be reflective of tribal lifestyles and consumption patterns. As an example, they observed that a number of tribes living “subsistence lifestyles” consume large quantities of a variety of fish species, which can complicate the development of accurate exposure scenarios, and that, for many tribes, fish advisories restricting or eliminating fish consumption are not a viable risk management solution, as, for many, tribes cannot give up their lifestyle practices in response to fish advisory warnings. (2003 Reno, pg. 24)

To help address these unique tribal exposures within the current risk assessment process, various suggestions were provided by the tribal representatives attending the workshops. These suggestions are outlined below.

***Include More Sensitive Populations***

At the 2005 Reno workshop, a tribal representative indicated that the current risk assessment processes needs to be improved to better include more sensitive populations, expanding current models, which focus mainly on exposures to the general U.S. population. (2005 Reno, pg. 17)

***Demonstrate Care When Developing “Tribal Default Values”***

EPA, in its *Exposure Factors Handbook*, summarizes data on human behaviors and characteristics affecting exposures and provides recommended exposure factor values. These recommended exposure factor values can serve as “default values” to be used by risk assessors when sufficient site-specific data for a specific geographic population is not available. These default values are generally based on the typical U.S. suburban population.

At the 2003 Albuquerque workshop, participants discussed the need to develop default exposure values that are more applicable for tribal communities than the current default values developed for the “general population.” However, tribal representatives expressed concerns that the default values developed for a particular tribe under a particular set of conditions could be construed as being “the tribal default values example,” which would

then be factored into all future tribal risk assessments. (2003 Albuquerque, pg. 19) During the workshop, a tribal representative had reported that the Shoshone-Bannock Tribes have experienced problems with this, involving a contractor that wished to utilize the default values developed by Barbara Harper for another tribe and extrapolate them for a risk assessment being developed for the Shoshone-Bannock Tribes. (2003 Albuquerque, pg. 16) Tribal representatives indicated that, where possible, default values should be replaced by the best available data for a given tribal community. (2003 Albuquerque, pg. 18)

When, during the *2005 Reno workshop*, a suggestion was made to develop a separate “tribal” exposure factors handbook, a tribal representative cautioned against development of a separate exposure factors handbook for tribes, observing that mainstream exposure factors should be the goal, focusing on the protection of all vulnerable populations. (2005 Reno, pg. 11-12)

#### ***Develop Tribal Exposure Scenarios***

At the 2003 Reno workshop, tribal representatives indicated that there could be no “one size fits all” tribal exposure model. However, it was noted that while no one model will fit all tribes, tribes should focus on developing a general “tribal” model developed on common tribal values and concerns, which can then be adapted and applied to tribal communities. (2003 Reno, pg. 13)

In general, workshop participants were supportive of current efforts underway by EPA to incorporate tribal exposure scenarios into risk assessment models. The efforts discussed included OPPTS’ Tribal LifeLine Project, which focuses on development of probabilistic modeling software that focuses on incorporating tribal exposure scenarios and lifestyles into a model measuring aggregate and cumulative pesticide exposures, allowing tribes to input the kinds of parameters that they feel are reasonable and reflective of their lifestyles (2005 Reno, pg. 20) and TASWER’s Native American exposure and risk assessment model, which will serve as a training tool for tribes allowing them to incorporate more tribally relevant exposure pathways when examining exposures to chemicals from hazardous waste sites. (2005 Reno, pg. 21)

A tribal representative indicated that developing tribally specific models does not necessarily require the development of individual models for each tribe in Indian Country and suggested that the development of EcoRegion-based models, such as those currently being developed by Barbara Harper under an EPA ORD Science to Achieve Results (STAR) grant represent a potential improvement to current “tribal” risk models. Barbara Harper is involved in developing EcoRegion-based scenarios that reflect unique regional resource bases. While specific usage patterns and usage rates could differ among tribes in a region, the regional-based scenarios could be adjusted for site-specific issues and represent a better baseline than existing suburban population default models. (2005 Reno, pg. 17) The EcoRegion-based models are not tribal- or site-specific, but could provide a better starting point for predicting risk than is currently supplied by national-level, suburban-based risk models. (2005 Reno, pg. 22)

Another factor to be considered when developing tribal exposure scenarios, as noted by a tribal representative during the 2005 Reno workshop, is that a number of tribes are currently working to restore their natural resources and ensure more sustainable resource use. In doing so, many tribes intend to not only continue but to increase their use of natural resources and traditional food sources. Therefore, when developing tribal exposure scenarios, modelers need to recognize and account for increased resource usage. (2005 Reno, pg. 21) As discussed during the workshop, a need exists for exposure scenarios to account for historical consumption rates and patterns that would allow tribes to sustain tribal traditional health and cultural practices (2005 Reno, pg. 18), and efforts are underway to describe traditional use and traditional (cultural) lifeways patterns for use in risk assessment, with the aim of restoring and protecting tribal resources and lifestyles. Rather than developing fish consumption surveys to identify current suppressed resource use and consumption levels, some researchers are looking at current subsistence and treaty information (as well as anthropological, environmental archeological, and historical information) to identify traditional (cultural) consumption patterns to serve as a good measure for resource restoration goals and accommodate for the resurgence of interest by tribes in traditional foods. (2005 Reno, pg. 22)

In addition, as tribes are trying to return to a more traditional diet, they are looking for ways to compare the risks posed by consuming traditional versus non-traditional food items. (2005 Reno, pg. 25) Though this needs to be balanced with the potential impacts of implementing dietary advisories if health impacts are determined, sensitivities are needed in weighing the potential health risks posed by contaminants and the potential health and cultural impacts that could result from the implementation of dietary advisories on traditional foods.

#### ***Incorporate Qualitative versus Quantitative Tribal Impacts***

During the workshops, participants discussed the need for both quantifiable and non-quantifiable impacts (e.g., loss of ceremony and culture of a tribe when contaminated river water—and/or the perception of this contamination—impacts a tribe's ability to participate in sweat lodges) be included in risk assessment processes. At the 2003 Albuquerque workshop, a tribal representative indicated that current risk assessment policies and procedures tend to ignore the impact of potential activities on tribal culture, such as the impacts of potential action on a tribe's origin or creation story, landscapes, historical stories, songs, dances, prayers, language, etc. She noted that while these impacts may not be easily quantifiable, they are vitally important to the continued health and well-being of tribal communities and the protection of treaty-reserved homelands. (2003 Albuquerque, pg. 6) At the 2005 Reno workshop, a tribal representative recommended that not only should quantifiable and non-quantifiable impacts be included, but they should be given equal weight in the risk assessment process. (2005 Reno, pg. 9) Additional discussion is needed to determine how best to incorporate qualitative impacts into the risk assessment process. As was noted by a tribal representative at the 2005 workshop in Reno, NV, the current scientific standards used by EPA require quantifiable threshold exposure levels to determine risk and questions

exist over whether and how tribal practices (e.g., access to ceremonial areas) can be monitored appropriately. (2005 Reno, pg. 9)

## **Section II: Developing a New Paradigm**

Although the TSC recognizes the need to improve the current risk assessment process to better incorporate tribal perspectives, there has also been a significant amount of feedback collected from tribes about more long-term alternatives to the current risk assessment paradigm for environmental decision making. The sections that follow highlight the feedback that was received from tribal representatives during the three workshops convened by the TSC regarding what this new paradigm should entail. The issues are presented in no particular order.

### **Incorporate a Health-based Focus**

During the 2005 Reno workshop, several participants asked for a more health-driven process, one that avoids looking at maximum risk and exposure levels. They observed that the current risk assessment paradigm focuses solely on hazard and risk assessment. A participant indicated that a safety/health-driven process is particularly crucial in relation to Reservation lands, as tribes and tribal lifeways are tied to tribal lands, and, therefore, precaution and protection are crucial elements. (2005 Reno, pg. 8)

### **Focus on Risk Prevention**

During the 2005 Reno workshop, several participants indicated that a new paradigm should focus on risk prevention rather than on cleanup after contamination has occurred. The paradigm should focus on protecting the next seven generations and beyond, geared toward protection of human health and the environment in perpetuity. (2005 Reno, pg. 8)

### **Incorporate Cumulative Impacts**

At the 2003 Albuquerque workshop, a tribal representative recommended that a future paradigm incorporate cumulative impacts. He suggested that the focus of current risk assessment policies and procedures be broadened to include more than just a single contaminant, noting that health effects from background levels of multiple chemicals, which exist in the environment in quantities that are right at the contaminant limit, while lawful, may pose considerable health risk and need to be addressed. (2003 Albuquerque, pg. 14)

### **Create a Holistic Paradigm—One that Incorporates Impacts to Community Health, Culture, Lifeways, Well-being and the Environment**

At the 2003 Albuquerque workshop, a tribal representative indicated that EPA and tribal communities are often at odds in terms of risk assessment science because of the language used by EPA in the discussion of risk assessment issues. He indicated that the EPA risk assessment paradigm discusses human health as the most important factor in the risk assessment process, and this contrasts with tribal traditions which view humans as the “younger brother” in a holistic worldview. He observed that this difference in view creates friction in Indian Country. (2003 Albuquerque, pg 4)

During the 2003 Albuquerque workshop, tribal representatives agreed that the current risk model being utilized by EPA is too narrow in scope and needs to be broadened to incorporate a more holistic view of tribal community health and well-being, one that incorporated impacts to

community health, culture, lifeways and well-being as well as the environment. During the workshop, one representative described the concept of risk, as perceived by the Shoshone-Bannock people. She indicated that, when compared to the traditional Western view of risk, which can be defined as the “chance of injury, damage or loss,” the Shoshone-Bannock concept of risk is viewed in terms of healthiness and the interdependency of all living things. This concept is closely tied to the physical, mental, and spiritual well-being of all components of the universe and must, for example, include an evaluation of the role of risk in the social, linguistic, ecological, cultural, and traditional values of the tribes. (2003 Albuquerque, pg. 15)

During another presentation at the workshop, a tribal representative provided an explanation of the worldview of Alaska Native communities, observing that this worldview is wholly different from other communities because Native Alaskan communities have been raised to see the world (and, subsequently, the environmental and health issues that they face) “through a different set of eyes.” She described the holistic nature of this worldview as encompassing physical, emotional, spiritual, and mental components and described the accompanying value system upon which the worldview was based. She stated that this worldview is a critical part of the native communities’ health and well-being paradigm. (2003 Albuquerque, pg. 8)

During another presentation at the workshop, two other representatives indicated that in the tribal worldview, healthy people and a healthy ecosystem are inseparable. They indicated that if aspects of traditional lifeways and risks to the cultural ecosystem are included within the risk assessment framework, risk assessments will also have a public health appearance, where “health” is understood to be comprised of an individual’s and community’s well-being with their lives fully integrated into a healthy ecosystem. (2003 Albuquerque, pg. 15)

### **Include Health and Wellness Indicators**

Throughout the various workshops, there was discussion over the development and use of health and wellness indicators and the need to incorporate these into decision-making processes. During the 2003 Reno workshop, it was noted that any model developed should be able to measure values common to all indigenous communities, taking into account for things such as self esteem, pride, cultural knowledge, and tribal heritage. It was noted that tribal communities understand the linkages between the environment and people and would be able to use a model developed on tribal understanding as a starting point to communicate ideas and evaluate cultural and social aspects of an issue and communicate these issues to outside groups. (2003 Reno, pg 13) During the 2005 Reno workshop, a tribal representative indicated that the fields of community- and public-health provided a good basis for examining the big picture of health impacts, both on the level of individual human health and community-wide health impacts, and observed that a number of cultural, social, health, and welfare indicators that are currently used in the public health arena and in social impact assessments can have direct applicability for tribal risk assessment. (2005 Reno, pgs. 22 & 25)

During the 2003 Albuquerque workshop, a tribal representative indicated that tribal communities are looking into ways to establish “life indicators” to measure the true health and well-being of their communities. He described a model being developed by the Assembly of First Nations called the Community Life Indicators Wheel, which can be used to identify

particular life indicators that are representative of an individual community. (A detailed description of the Community Life Indicators Wheel and The Assembly of First Nations Community Health Indicators project can be found in "Mohawk Council of Akwesasne, Community Health Indicators, Changes in These Indicators and the Analysis of Risk to Social Structures and Cultural Practices.") (2003 Albuquerque, pg. 11)

During the 2003 Reno workshop, tribal participants identified a number of potential cultural and community health indicators that could be used to help measure the health and well-being of tribal communities. These indicators included:

- **Cultural Indicators**, including: (1) gathering activities (e.g., funerals, spiritual and seasonal gatherings, marriages, coming of age ceremonies, pow wows, dances, pilgrimages, hunting and gathering practices, and leadership activities; (2) ceremonies (e.g., sweat lodges, births, doctoring/healing, dances, clan ceremonies, blessings, and purifications; and (3) cultural activities (e.g., language, songs & art, basket making, growing traditional crops, gathering traditional medicines, attendance at classes teaching cultural traditions, level of understanding/use of natural resources by tribal people, and changes in cultural/subsistence practices).
- **Health Indicators**, including: (1) negative indicators (e.g., suicide, substance abuse, mortality/birth rates, cancer rates, mental health statistics, addictive behaviors, human lead and mercury levels, and disease statistics) and (2) positive indicators (e.g., decreases in disease, family integrity, and nutrition).
- **Community Indicators**, including: incarceration rates, visits to drug court and tribal courts, number of individuals involved in foster programs, vandalism, gangs/drug dealers/methamphetamine labs, domestic violence, family (the perception/definition of who family is by tribal peoples, how well the community is reflected in the extended family, where people live, are family members living close to each other and maintaining a sense of family, is the community family oriented), elder center, education rates, participation in youth club activities, day care, availability of emergency and disaster preparedness services, communication.
- **Natural Resource Indicators**, including: tracking of historical land uses; programs and projects being implemented by tribal communities to restore, rehabilitate, and enhance their local environments; measurement of appreciation/media coverage of such activities by outside entities was recommended as a potential indicator measurement; reintroduction of native species; presence of a fisheries department; the number and type of fish being caught by community members; quantification of wetland restoration activities; availability of natural resources to continue traditional practices (i.e., sweet grass, clays, paints, and berries) and whether these resources are being impacted by contamination; roadside spraying and its impact on the ability of tribal communities to continue traditional practices; measurement of the stability of the acreage where traditional activities are practiced; the number of people utilizing walking trails, tribal cultural sites, and other natural resources; whether tribal practices are being

impacted by outside groups competing for the same resources or through destruction of habitat through other purposes; and the availability of water – both in respect to water quality and quantity. (2003 Reno, pg 14-16)

### **Use a Cross-Media Approach**

During the 2005 Reno workshop, several tribal participants indicated that the new paradigm should not be “Program-specific,” i.e., should not be focused on a particular media, such as water, soil, or air, but rather should involve a cross-media approach. (2005 Reno, pg. 8) At the 2003 Albuquerque workshop, several tribal representatives indicated that the current EPA methodology for CERCLA and media Acts (CAA, SDWA, CWA) are geared toward single media, single contaminants, and single pathways, rather than being cumulative. They suggested that if CERCLA were more like NEPA and comparative risk, and if human health risk assessments were combined with ecological (or eco-cultural) risk assessments, then a cumulative method that reflects tribal perspectives and traditional lifeways could be achieved. They observed that the CERCLA statute does not prevent this; it simply has not been done before. (2003 Albuquerque, pg. 15)

### **Reflect the Precautionary Principle**

During the 2005 Reno workshop, a number of individuals suggested that the precautionary principle be considered as a basis for possible alternative approaches to the current risk assessment paradigm for protecting human health and the environment. It was noted that a number of nations, states, and municipalities are already moving to adopt the precautionary principle. However, a tribal representative, who serves on the Tribal Pesticide Program Council, cautioned that an approach based on the precautionary principle might not be universally applicable. She noted that, in the case of pesticide registration, risks posed by pesticides are often not fully understood until the pesticide has been released into the environment, at which point environmental contamination has already occurred. (2005 Reno, pg. 8)

### **Recognize that for Some Tribes, a “Zero Contamination Policy” Exists**

During the 2005 Reno workshop, a tribal participant noted that an inherent concern in discussing risk standards and setting exposure levels, remains that many tribal members are insistent that there is no allowable contamination level other than “zero” contamination; their philosophy and beliefs will not allow them to agree to any level of “acceptable” contamination. The participant noted that this creates problems, particularly given EPA’s current risk assessment approach, and, as a result, can stall cleanup efforts. (2005 Reno, pg. 8)

### **Work with Tribes on a Government-to-Government Basis**

Tribal participants indicated that it is imperative that EPA work with tribes on a government-to-government basis when considering changes to EPA’s risk assessment policies and procedures. During the 2003 Albuquerque workshop, a TSC tribal representative expressed concerns that tribes had not been fully consulted during the development of EPA’s cumulative risk assessment framework, noting that the Federal government has a mandate to consult with tribes on a government-to-government basis on issues that ultimately affect Tribes. (2003 Albuquerque, pg. 4) During the 2005 Reno workshop, a number of tribal participants asked that EPA enter into government-to-government consultation with their individual tribes to develop

recommendations for improving EPA's risk assessment policies and procedures. A recommendation was made that EPA send representatives out to all tribes in Indian Country to explain the issues...and answer questions raised by tribes. (2005 Reno, pg. 13)

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